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Comparisons Inform Me Who I Am: A General Comparative-Processing Model of Self-Perception

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Abstract

People's self-concept contributes to their sense of identity over time. Yet self-perception is motivated and serves survival and thus does not reflect stable inner states or accurate biographical accounts. Research indicates that different types of comparison standards act as reference frames in evaluating attributes that constitute the self. However, the role of comparisons in self-perception has been underestimated, arguably because of lack of a guiding framework that takes into account relevant aspects of comparison processes and their interdependence. I propose a general comparative model of self-perception that consists of a basic comparison process involving the individual's prior mental representation of the target dimension, the construal of the comparison standard, and the comparison outcome representing the posterior representation of the target dimension. The generated dimensional construal is then appraised with respect to one's motives and controllability and goes on to shape emotional, cognitive, and behavioral responses. Contextual and personal factors influence the comparison process. This model may be informative in better understanding comparison processes in people's everyday lives and their role in shaping self-perception and in designing interventions to assist people overcome undesirable consequences of comparative behavior.

Keywords

self-perception, self-concept, mental representation, comparison, comparative processing model (gCOMP)

Self-perception is subjective and dynamic. Still, in both everyday life and research, evaluations of a person's self-concept and of any of the mental or physical attributes that constitute the self are considered as valid and reliable. However, exact judgment of inner states would require one to examine and integrate an immense number of relevant aspects of one's life, a faculty that humans lack (H. A. Simon, 1957). Furthermore, accumulating research demonstrates that memory is subject to modification (Conway & Loveday, 2015), which in turn questions the accuracy of judgment about self-perception. Moreover, judgment is motivated (Sedikides & Strube, 1997) and serves survival and thus does not reflect stable inner states or accurate biographical accounts. Thus, judgment is highly sensitive to contextual influences (Higgins, 1996; Schwarz & Strack, 1999).

Some theories of judgment suggest that judgment is not based on absolute values or standards but rather on ordinal comparison (Vlaev et al., 2011). This implies that people cannot calculate the value of a variable in isolation because judgment lacks any utility scale but, rather, need a direct comparison with some other variable to judge the value of the variable in question (Stewart et al., 2006; Tversky, 1972). Consequently, evaluations of self-perception are based on frames of reference and may shift with selected comparison standards. Research has shown that judgments may further be influenced by comparison standards determined at random (Tversky & Kahneman, 1974) even if judges themselves readily judge these standards as irrelevant (Englich et al., 2006). Accordingly, depending on the comparison standard and the given context, a person might feel young or old, poor or rich, healthy or sick.

Potential Comparison Standards

Comparison processes in relation to attributes and possessions were reported in the 19th century (James, 1890)

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Table 1. Possible Comparison Standards

Type and form	Example With *Upward/Lateral/Downward* Directions Concerning Appearance
Social	
Familiar	Comparing your appearance with a close friend who looks *better/similar/worse* than you.
Unfamiliar	Comparing your appearance with someone unknown to you who looks *better/similar/worse* than you.
Temporal	
Past	Thinking that you used to look *better/similar/worse* than currently.
Prospective	Thinking that you might look *better/similar/worse* in the future than currently.
Criteria-based	
Ideal	Imagining *the best/worse* you could possibly look in relation to your current appearance.
Ought	Thinking about how people your age and gender should look and that you look *worse/similar/better* than this.
Dimensional	
Compensatory	Thinking that you have other personal attributes that *make up for what you lack* in appearance. Thinking that your appearance *makes up for what you lack* in other personal attributes.
Salience	Thinking of your appearance as a uniquely *better/worse* attribute compared with your other personal attributes.
Counterfactual	
Should have not been	Thinking that if certain things had not happened in the past, your appearance would now be *worse/better*.
Might have been	Thinking that if certain things had happened in the past, your appearance would now be *worse/better*.

Note: Some forms of comparison may lack lateral directions (e.g., ideal criteria-based comparison).

and were followed by more accurate definitions in the 20th century (Festinger, 1954; Thibaut, 1959). Several types of comparison standards that share numerous conceptual parallels act as frames of reference in evaluating self-perception. The most prominent type of comparison standards is social comparison, followed by temporal, criteria-based, dimensional, and counterfactual comparisons (see Table 1).

Social comparison

Festinger (1954) argued that there is a drive within individuals to gain accurate self-evaluations through social comparison by seeking similar others as an upward comparison standard to maintain a stable self-concept. Other researchers have extended this theory to include social comparison as a means of evaluating one's coping with stressful situations (Schachter, 1959) or to include downward comparisons when the self is threatened with the goal of improving one's self-esteem (Wills, 1981).

A recent systematic review of 145 publications on social comparison (J. P. Gerber et al., 2018) summarized research findings of the choice of comparison standard (who individuals compare with) and effects of comparisons while also focusing on potential moderators. The authors concluded that individuals generally tend to choose an upward (rather than downward) comparison standard and that threat leads to increased upward comparisons. However, the choice of comparison standard became less differentiable when a lateral choice was also provided. Furthermore, the authors reported a general contrast effect (i.e., feeling worse after an upward comparison or better after a downward comparison) and that these effects were strongest in relation to the directly measured comparison dimension as well as if the dimension at hand was novel and/or with local or in vivo standards. Finally, implicit or explicit preoccupation with similarity before engaging in comparisons seemed to lessen this effect.

Temporal comparison

Temporal comparison relates to comparing a present self-description with a self-description in the past or envisioned prospective selves. Albert (1977) proposed that individuals prefer to make comparisons with the near past and that downward temporal comparisons (i.e., with lower prior abilities) may have positive effects on the self-concept, whereas upward temporal comparison may have a negative impact on the self-concept. Downward past temporal comparisons and upward prospective-temporal comparisons seem more frequent than upward past and downward prospective-temporal comparisons (Wilson & Ross, 2000). Furthermore, negative appraisal of past selves seems to be moderated by temporal distance such that distant past selves are appraised more negatively than present selves (Wilson & Ross, 2001). Yet research on temporal comparison remains scarce.

Dimensional comparison

Dimensional comparisons occur when individuals compare their attributes intraindividually across domains (Möller & Marsh, 2013). Research in this area has been conducted mainly in the context of self-concept in educational psychology and has shown that dimensional comparisons affect self-evaluations of ability. For example, when students received positive (or negative) achievement feedback in math, this decreased (or increased) their verbal self-concept even in the absence of any information in the verbal domain (Möller & Köller, 2001). However, these results do not hold for domains perceived as similar, such as math and physics abilities (Möller et al., 2006). Research suggests that individuals in older age engage more frequently in dimensional than in social or temporal comparisons when considering their own attributes (Möller & Weber, 2001). Yet research on dimensional comparisons has been largely ignored by fields other than educational psychology (Möller & Marsh, 2013).

Counterfactual comparison

Counterfactual comparisons involve comparing the current self with a hypothetical self that might or should have occurred but did not actually occur and is thus counter to the facts. Counterfactual comparisons arise when current outcomes deviate from expectancies and normative outcomes are constructed as an alternative and serve as a comparison standard (Kahneman & Miller, 1986). The hypothetical outcomes can be defined as expectations of what should have happened, or not, and how these might have led to an alternative life. When people generate counterfactual thoughts, normality and controllability of the antecedents to the event influence the content of counterfactual thoughts (Olson et al., 2000). Roese and Epstude (2017) characterized the form of counterfactual thinking by direction (upward vs. downward), structure (addition of a new element not present in actuality [*additive counterfactual*] vs. deletion of an element that was present in actuality [*subtractive counterfactual*]), or social focus. By *social focus*, the authors mean whether the counterfactual's element connects to oneself or another individual (i.e., internal vs. external locus of causation). Keep in mind, however, that the counterfactual's elements might also connect to nonsocial variables, such as the thought, "If it had not rained, the car accident would not have happened." Accordingly, counterfactuals can be classified as *self-*, *other-*, or *nonreferent*—that is, whether past actions of the self, others, or no one specific are mentally altered to construct alternative outcomes (Hoppen & Morina, 2021).

It is further relevant to make a distinction between counterfactual thinking in general and counterfactual comparison. Comparison thinking relates to things that should not have happened or should have happened and may or may not include a comparative assessment of current self-attributes to hypothetical standards. Counterfactual comparison, on the other hand, concerns the comparison of an attribute in real life with attributes in the imagined life one might have had (Morina, 2020). Thus, counterfactual comparison involves a two-step process. First, a counterfactual alternative to reality is created by mental simulation. Second, the generated counterfactual alternative is compared with reality. Whereas many studies have examined counterfactual thinking (Roese & Epstude, 2017), there is lack of research on counterfactual comparison (Hoppen et al., 2020).

Criteria-based comparison

Personal standards represented in internalized norms, cultural values, or aspirations are a relevant component of self-perception or self-knowledge (Lewin, 1951). These can be defined as internalized criteria of excellence or acceptability and help individuals evaluate how they are doing while comparing the current state with some desired or undesired end state (Higgins, 1996). Criteria-based comparisons of mental representations of the current state of attributes can be first done with socially shared or codified rules, requirements, and principles. They can, however, also be based on internalized principles, norms, or aspirations. For example, a university student must meet certain external requirements to successfully complete his or her study. However, self-appraisal of academic achievements and cognitive faculties may further depend on internalized principles, norms, or aspirations.

Altogether, a distinction of perceived norms can be made between (a) descriptive norms (i.e., socially shared norms about what others do), (b) subjective norms (i.e., beliefs about what important others expect one to do or be), (c) and injunctive norms (i.e., beliefs of what is commonly approved or disapproved by others; Bell & Cox, 2015). All these norms may relate to the ideal expectations, realistic expectations, and ought selves. Whereas internalized norms, cultural values, or aspirations in relation to cognitions, emotions, and behavior have been examined to a great extent, there is lack of research on criteria-based comparison, apart from single studies on academic self-concept (Jonkmann et al., 2012).

Other types of comparison

In addition to the five types of comparison standards reported above, other single types as well as mixed types of comparison standards may occur. Certain types of comparison standards might be specific to the dimension

of self-perception that is being assessed. In our recent study (Morina, Sickinghe, & Meyer, 2021) on comparison processes in the evaluation of well-being among patients with mental disorders, we noticed that patients made context-based comparisons when talking about their well-being. For example, patients with depression might feel more depressed when being alone than with a partner. Accordingly, they would compare their well-being when being alone and being with a partner and conclude that they are currently feeling bad. In addition, comparisons may also take place in mixed types of standards that act interdependently.

Shortcomings of current research on comparison

Current research has been productive in increasing knowledge about the role of comparison standards on self-perception. However, social comparison is the only domain examined excessively, and research in this field might be divided into selection, reaction, and narration assessment methods (Wood, 1996). In the selection method approach, the comparison standard is the dependent variable. These studies have used different paradigms with the aim of identifying the conditions under which comparison standards are chosen and the reactions following the comparison process. For example, in the first study to apply the rank-order paradigm (Wheeler, 1966), male participants were told following a test that they were in the middle rank (i.e., 4) in a group of seven and that they may select the score they would like to know of one other participant. Many studies also applied the affiliation paradigm, in which participants were told that they will experience an electric shock and were offered the choice of waiting with others who might differ with respect to whether they are also awaiting an electric shock, their level of fear, overall similarity, or certain personal characteristics (e.g., Li et al., 2008). In studies using the looking measures paradigm, participants are offered the opportunity to examine social information, and the degree to which they take that opportunity is measured (e.g., Corpus et al., 2006). A limitation of the selection method studies, however, is that selection of social information is equated with social comparison. However, motives for this selection may or may not relate to social comparison, and nonselection of social information may be the result of avoidance (Wood, 1996).

In the reaction method approach, the standard is the independent variable and participants' reactions are the dependent variable. In quasiexperimental studies, participants are presented with social information to assess predictors, reactions, and consequences of social comparison. One of the earliest examples was the Mr. Clean/Mr. Dirty study during which participants filling out a job application found themselves sharing a table with either a well-dressed and highly organized young man or a disheveled and disorganized young man (Morse & Gergen, 1970). The authors assessed the change in self-esteem from a pretest depending on the condition participants were in. Consequences of social comparison have also been assessed in correlational studies assessing more enduring reactions in daily life (e.g., life satisfaction or self-esteem among students with high grades). Reaction studies, too, have their limitations. Individuals being exposed to social information may not necessarily engage in social comparison. Likewise, the results of the correlational studies conducted in participants' social environment may be limited by uncontrolled factors.

The narration approach collects descriptions of naturally occurring comparisons that were encountered, selected, or constructed. Studies on social comparison have applied self-report methods and free responses presented verbally or in written form (Buunk & Gibbons, 2007). The accuracy of the results emerging from narration methods may, however, be limited because of lack of awareness if comparisons are not salient, lack of recall of relevant comparisons, denial of aversive comparisons, social desirability, selectivity, or aggregation processes in the context of the study.

Apart from methodological limitations, there is controversy regarding the definition of social comparison (Wheeler & Suls, 2020). Some authors have defined comparison as a process that changes the individual's self-evaluation (Arrowood, 1986), whereas others have applied a rather wide definition of social comparison (Suls et al., 2002). This lack of consensus has had great implications for how studies have been designed and interpreted. Some research on comparison has used affect or state self-esteem as the dependent variable, and from that it has inferred whether assimilation or contrast had occurred. However, it has been known for decades that comparison might have differing impact on affect or self-esteem. Furthermore, inference from reactions to potential social standards might erroneously define the processing of social information as comparison. For example, exposure to upward social standards might sometimes increase positive affect or self-esteem through reflection, defined as basking in reflected glory (Tesser, 1985). Definition problems relate to other aspects of the comparison process as well. For example, often the labels *target* and *standard* as well as *comparative evaluation* and *consequences* are used interchangeably. Other limitations include the lack of research on other types of comparison than social comparison and the use of multiple or mixed types of comparison standards. Altogether, researchers

still lack a guiding framework that takes into account relevant aspects of comparison processes and their interdependence.

General Comparative-Processing Model (gCOMP)

Drawing on existing theories and research findings, I propose a general comparative-processing (gCOMP) framework that can be used to examine the dynamic and complex nature of comparison processes. The model postulates first that the everyday definition of comparison as an examination of two or more variables to establish similarities and/or dissimilarities is sufficient and should not include potential effects. Second, it postulates that comparisons provide answers to three types of questions: (a) "what" questions that relate to object recognition or to what an attribute represents (e.g., What is intelligence relative to knowing many things?), (b) "where" questions that relate to localization or where one stands with respect to that attribute (e.g., Where do I rank compared with other people on intelligence?), (c) and "how" questions that relate to whether temporal change has taken place or how an end goal can be achieved (e.g., How can I become smarter?). Accordingly, to recognize an object or concept, people need to perceive it as different from other objects or concepts, and these other objects/concepts serve as potential standards. When people have some useful definition of what the attribute is, they may engage in thinking about where they stand in comparison with others or with some criteria. When they have some useful definition of where they stand, they compare to evaluate whether change has taken place or is likely to take place in the future. For example, once "what" questions have helped people to form an understanding of mindfulness as being the opposite of being on autopilot (i.e., standard) and still different from relaxation (i.e., another standard), the "where" questions inform about their ability to be mindful relative to other people (i.e., standard) or other attributes of their own (i.e., another standard). Finally, "how" questions inform people that they are currently more mindful to the surroundings than some time ago (i.e., standard) and that they anticipate being even more mindful in the near future (i.e., another standard) if they keep training every day.

Given research demonstrating that several self-motives serve as determinants of the self-evaluation process, a third assumption of the model is that comparison processes are driven by key self-motives identified in previous literature, such as self-assessment, self-improvement, self-enhancement, and self-verification (Sedikides & Strube, 1997). Self-assessment comparisons serve the need to gain accurate information about the state of self-attributes and self-possessions (Festinger, 1954). Self-improvement serves motivation for improving the self (Taylor & Lobel, 1989) and may produce a trade-off between the immediate negative reactions and long-term positive preparative effects of comparison to appetitive standards (Lockwood & Kunda, 1997). Self-enhancement posits a desire for either attaining or maintaining a positive self-view, which causes people to prefer favorable information rather than accurate but possibly unfavorable information about themselves (Taylor et al., 1995). The self-verification motive denotes the desire to confirm a preexisting view of self by selecting comparisons that confirm the self-concept, which may cognitively distort information to make it consistent with the self-concept (Swann, 1987).

The model further suggests that comparisons may be best characterized as a process that consists of the following subcomponent processes: (a) the activation of the comparison process and selection of the comparison standard, (b) the basic comparison process that generates a posterior target construal, (c) the valuation of the comparison outcome with respect to the comparer's motives and coping, and (d) the emotional, cognitive, and behavioral responses. The comparison process can be triggered and influenced by different contextual and personal antecedents. Finally, multiple characteristics of the basic comparison process and the engendered responses influence the comparison outcome and its impact. The model is illustrated in Figure 1.

Activation of the comparison process and standard selection

The activation of the comparison process is elicited by exogenous or endogenous stimuli and can emerge either autonomously or be instigated intentionally. This activation is influenced by different antecedents (see below) and directly relates to the selection of the comparison standard. In some cases, preoccupation with a certain comparison standard represents an already selected comparison standard (e.g., listening to an introduction of a keynote speaker at a conference is likely to evoke social comparison among colleagues in the audience). At a later time, during the comparison process or in other cases, comparison standards are selected to meet certain motives.

Basic comparison process

The basic comparison process constitutes the comparative assessment part, defined as the process of examining similar and distinctive features between two or more variables in relation to one or more dimensions. The

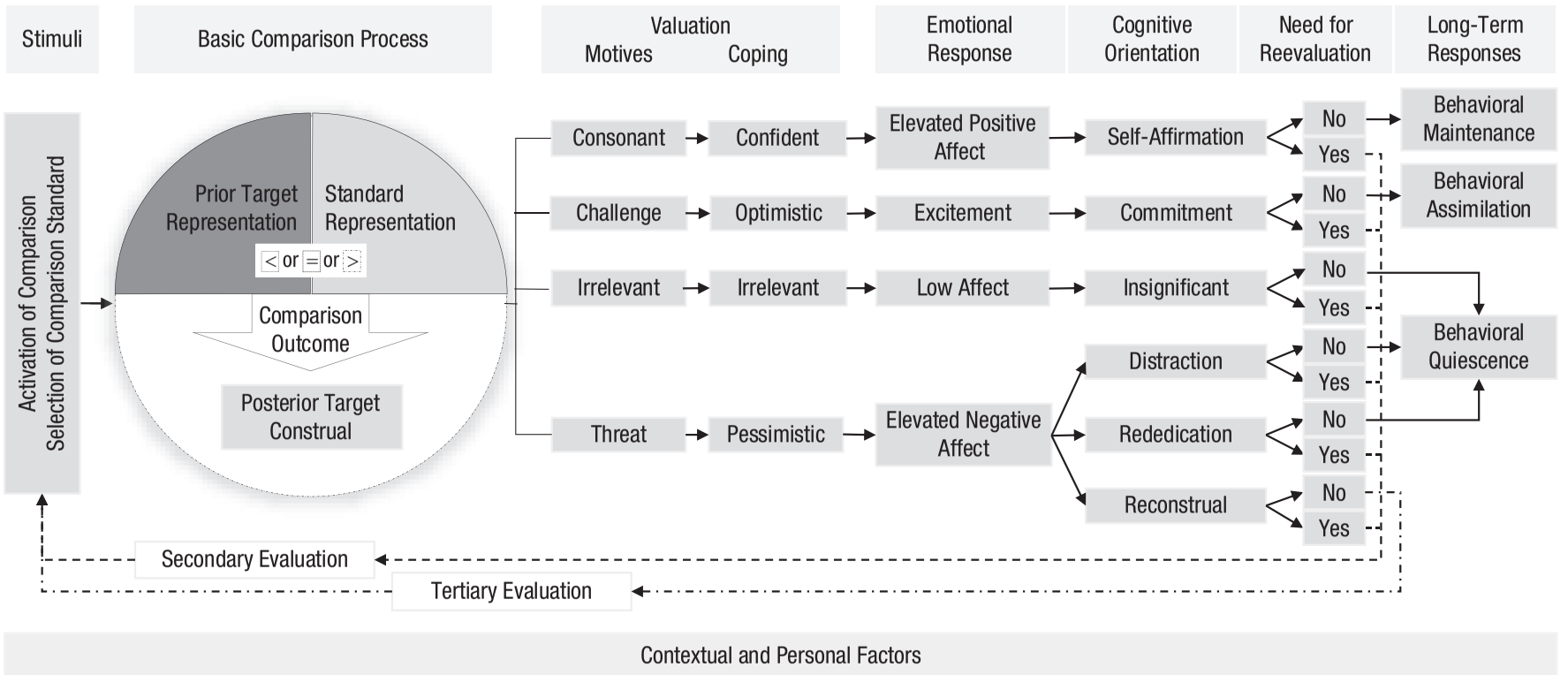

Fig. 1. General comparative-processing (gCOMP) model of self-relevant information.

dimensions with respect to self-perception represent mental or physical attributes that constitute the self, and the variables constitute the targets and standards. For example, when preoccupied with appearance (i.e., the dimension), I might compare my current appearance (i.e., the target) with someone else's or my memory of my past appearance (i.e., the standards). Accordingly, the basic comparison process involves three variables: (a) individual's prior mental representation of the target dimension, (b) the mental representation of the standard, and (c) the integration of the first and second components that equals the comparison outcome, which represents the dimensional construal of the comparer. The first and second components are defined as independent variables and the comparison outcome as the dependent variable.

Comparison dimensions. The comparison dimension refers to the variable being evaluated. With respect to self-evaluation, the dimension consists of the individual's reflections about personal quantitative or qualitative characteristics such as skills, intelligence, opinions, appearance, wealth, health, gender, ethnicity, or the outcomes they generate such as status or power. Thus, the dimension is the core variable in the comparison process. Comparisons run along a continuum between specific dimensions (e.g., evaluating whether one is overdressed at a particular party in comparison to other guests) to general dimensions (e.g., evaluating whether one is the worst person at this company). In the latter case, comparers may go through two or more specific dimensions to evaluate their own attributes relative to their coworkers.

Target representation. The target representation relates to the dimension being evaluated. If the dimension is, for example, intelligence, then the representation of the target relates to the comparers' perception of their own intelligence. Target representations are context dependent and dynamic, with some representations being more dynamic then others (e.g., height vs. intelligence).

Comparison standards. Standards can be defined as frames of reference established by experience or authority for the measure of quantity or quality that include both descriptive and prescriptive components. In relation to self-perception, a comparison standard represents the benchmark against which the evaluator compares a characteristic of oneself. Altogether, standards might constitute one's own characteristics, someone else's, external criteria, and possibilities.

Overall, comparisons are made to either single or multiple standards. Comparisons to multiple standards are composed of standards from the same category (e.g., comparison of my appearance to all gym members in the case of social comparison) or standards from different standard categories (e.g., temporal and social comparisons). Comparisons with multiple standards may further be serial (e.g., comparison of my appearance with the single members of the gym) or to a prototype representing the distribution as a whole. Furthermore, comparisons can also be made with an exemplar pulled from memory that is perceived as representing the distribution as a whole (e.g., thinking of Daniel Kahneman when comparing my academic productivity with that of influential psychologists). Several factors can influence whether serial, prototype-based, or exemplar-based comparisons are made, such as the size of potential comparison standards (with small groups of potential comparisons more likely to be compared serially), perceived similarity of potential comparison standards (with higher similarity leading to prototypical comparison standards), or familiarity (with increased familiarity leading to prototypical comparison standards). The judgment and decision-making research suggests several ways how comparisons to multiple standards can be made.

Theoretical models of prototype, such as norm theory (Kahneman & Miller, 1986), suggest that when comparers are confronted with multiple potential comparison standards, they usually simultaneously recruit multiple representations and aggregate them together on the basis of certain properties of individual standards. Thus, the overall aggregated representation of the group of potential comparison standards serves as a prototypical comparison standard. Theoretical models of exemplars, on the other hand, propose that judgment is based on sequential comparison of the target to multiple individual members of the given distribution (Vlaev et al., 2011). If the distribution of potential standards is large, comparison will be made to a subsample of standards, such as more salient or more easily accessible standards. Exemplar-based models, such as the decision by sampling theory (Stewart et al., 2006), may be more accurate in explaining evaluations of a given target to an asymmetrically distributed sample of comparison standards. Furthermore, both prototype- and exemplar-based theories are subject to memory bias. Finally, there is indication that both prototype- and exemplar-based representations may be part of the same comparison process (Smith & Zarate, 1990), in which aggregated representations of a group of potential standards are admixed with exemplars. Evaluations of a given target relative to multiple standards are influenced by relevant characteristics of the potential comparison standards, such as range frequency (Parducci, 1965), overweighting of end moments (Kahneman, 2003), or atypical exemplars (Morewedge, 2013).

Comparison direction. Direction refers to the standing of the standard against which the comparison is made. Comparisons with standards perceived as better off in relation to the target have been defined as upward comparisons, whereas comparisons with standards perceived as worse off have been defined as downward comparisons. Finally, comparisons with standards perceived as similar to the target have been referred to as lateral comparisons.

The choice of direction of comparison might depend on one's motives, the self-relevance of the dimension, salience and availability, and the context. In addition, comparison direction might activate different psychological processes. Some authors have suggested that upward social comparisons may rather activate promotion goals aimed at obtaining an appetitive end state, whereas downward comparisons may rather activate prevention goals aimed at preventing an aversive end state from occurring (Lockwood, 2002; Lockwood et al., 2002). However, several factors are likely to have an impact on the degree to which these processes are activated, such as level of contrast and controllability. For example, a perception of a strong contrast between the target representation and the standard representation might lead to high ego threat, which might force the comparer to either abandon the comparison process altogether or intentionally initiate a secondary or tertiary evaluation aimed at either a better evaluation of the dimension in question or at improving current affective and cognitive reactions (see below).

Moreover, the impact of upward, lateral, and downward comparison may differ across different types of comparison standards. For example, relevant significant upward social standards that produce contrast (e.g., my next-door colleague looks much better than I do) are generally likely to lead to negative self-evaluation and negative affect. Yet upward prospective-temporal comparisons (e.g., I will look much better in the future as a result of the fitness training that I have recently committed to) are likely to engender positive self-evaluation and affect. In addition, we must not treat lateral comparisons as if they were neutral comparisons in the sense that they do not affect self-evaluations and engendered reactions. There are instances in which lateral comparisons are perceived as aversive or appetitive rather than neutral. For example, individuals who have been thinking that they are the best in a certain category are likely to be affected by lateral comparisons. On the other hand, perceiving oneself as similar to a highly skilled person is likely to reinforce one's behavior working toward achieving the appetitive end state. Furthermore, a long-held belief that one will improve over time is likely to influence one's affect and cognitions during lateral past temporal comparison.

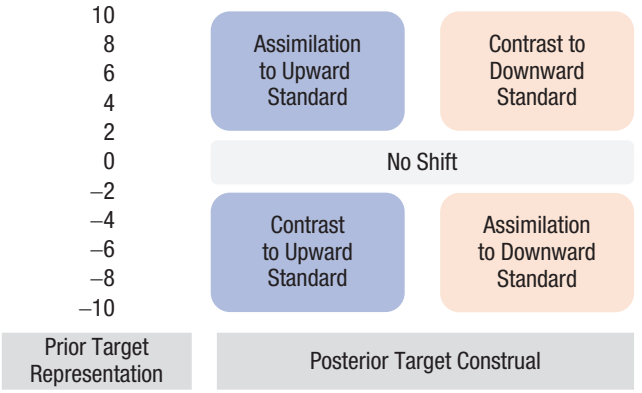

Fig. 2. Potential comparison outcomes relative to the prerepresentations of the target.

Comparison outcome. The comparison outcome is the result of comparing the target with the standard that produces a dimensional construal of the target in question. The comparative evaluation is first influenced by the strength of the automatic association between the target and standard, which may have been structured by learned similarity and contiguity over many experiences. Then, the initial similarity testing is influenced by the accessible information, which might be influenced by incidental information and availability in memory. Then motivational orientations may affect the similarity testing. Altogether, the comparison outcome is defined as labile and dynamic because it depends on several factors that might vary from context to context. Recency effects, framing effects, priming, current needs and goals, as well as affect influence what and how internal and external information is being used (Bless & Burger, 2016).

The comparison outcome represents the potential shift from the prior representation to the posterior representation of the target. Accordingly, the comparative process may result in assimilation or contrast of the target to the standard relative to the prior target representation. Assimilation occurs when the comparer's self-evaluation moves toward the comparison standard. Contrast, on the other hand, occurs when the comparer's self-evaluation moves away from the comparison standard. Thus, assimilation and contrast are best defined as posterior outcomes relative to a prerepresentation of both the target and the standard. Altogether, there are five possible comparisons outcomes relative to the prerepresentation of the target (see Fig. 2).

Valuation of comparison outcome

During the comparison process, the comparer will implicitly or explicitly reflect on it. Referring to the merits of appraisal and emotion regulation research (Ellsworth, 2013), I posit that decoding the meaning of

the comparison outcome influences the nature and intensity of emotional, cognitive, and behavioral reactions that follow the comparison outcome. Upon the emergence of the posterior target construal, the comparer processes its motivational meaning. Motives are defined here broadly to include any conscious or unconscious representation of a desired end state, including basic needs, values, and goals (Dweck, 2017). The valuation is conducted on several appraisal dimensions as suggested by appraisal models, including relevance, valence, controllability, likelihood, and coping capability. This produces two outputs, the motivational meaning and the resulting coping potential. The decoding of the meaning of the comparison outcome translates into four outcomes that reveal the extent to which motives are met and the respective perceived coping potential. The outcome (a) may be consonant with the motives and lead to confidence that the desired end state is met or will be met in the future, (b) may challenge the motives yet lead to optimism that the end state will be met, (c) may be irrelevant to the motives and coping, or (d) may threaten harm to the motives or indicate that harm has taken place and result in pessimism. Correspondingly, the motivational significance of the comparison process can be defined as either appetitive (i.e., consonant with or challenging the motives), neutral (i.e., irrelevant to the motives), or aversive (i.e., threatening the motives).

Emotional, cognitive, and behavioral responses

The appraisal outcome goes on to first shape emotional responses. Comparison outcomes that are consonant to motives and lead to confidence that the desired end state is or will be met will produce happiness or related enjoyable emotions. Excitement emerges as a high-intensity response when comparison outcomes challenge motives and lead to optimism that the comparer has the necessary means to achieve (or avoid) the appetitive (or aversive) end state. On the other hand, comparison outcomes that are irrelevant to motives will not lead to significant positive or negative affect. Finally, comparison outcomes that pose a threat to motives and lack optimism that one can successfully achieve (or avoid) appetitive (or aversive) end states will lead to different negative emotional reactions. The valuation of the relationship between the dimensional construal and motivational meaning may result in perceptions of threat or harm and be associated with fear. The valuation process may also result in perceptions of resignation indicating that an appetitive (or aversive) end state cannot be achieved (or avoided), and the comparer's emotional response will be sadness. Likewise, the valuation process might indicate that something is interfering with the pursuit (or avoidance) of an appetitive (or aversive) end state, and accordingly, the comparer's emotional response is anger. However, the suggested emotional responses might be accompanied by other emotions, and the initial emotion might turn into other emotions. For example, the emotion of excitement usually emerges with other emotions, and sadness might turn into anguish (Ekman & Cordaro, 2011). Yet when preoccupied with self-relevant comparisons, in most cases one of the five emotions (happiness, excitement, fear, sadness, and anger) will be experienced as the main emotion that will eventually go on to shape cognitive orientation and ultimately behavioral responses.

Cognitive responses consist of two aspects. Emotional responses are first accompanied by cognitive orientation, which in turn affects long-term behavioral responses. Cognitive orientation facilitates goal-directed behavior to the extent that the comparers are confident that they can successfully move toward a desired end state. In this regard, happiness or related enjoyable emotions are processed as self-affirmation that one is on the right track and no significant behavioral change is necessary. Self-affirmation is then associated with behavioral maintenance, which indicates that the comparers see no need to significantly change their behavior. Excitement informs that the desired end state can be achieved, and one's cognitive orientation relates to the need to put extra efforts toward achieving the desired end state, which should ultimately lead to behavioral assimilation. This may include a cognitive preoccupation about how potentially favorable contextual factors and/or particular personality traits might predispose the comparer to a more successful path. Irrelevant comparison outcomes that produce low emotional responses will demand little cognitive and behavioral resources, the latter being defined as behavioral quiescence. Behavioral quiescence is also a likely consequence of relevant comparison outcomes that produce elevated negative affect. For example, intense fear may reinforce the belief that the threat is too aversive to one's motives, and hence the cognitive orientation is toward distracting from the comparison outcome and the need to work toward (or against) the appetitive (or aversive) end state. Distraction occurs by focusing on some new activity. Yet in some cases, elevated negative affect may be followed by vicious cycles of dysfunctional cognitions (Hoppen et al., 2020).

Elevated negative affect as a result of the incongruence between motives and coping abilities can, however, also lead to the reappraisal of the motivational significance, or the posterior target construal, or both. Intense emotions may lead to questioning the relevance of the motives and ultimately to rededication. For example, upon comparing my current appearance with my past appearance, I might become pessimistic that I will

ever look as good as I used to. This might lead to feelings of sadness, and my cognitive orientation might be toward the relevance of my looks at the current age. If rededication is achieved (i.e., by changing something about the currently active motives), behavioral quiescence is likely to be the consequence. Yet elevated affect may also be followed by reconstrual (Uusberg et al., 2019), which involves changing how the comparison process is construed. For example, comparers might conclude that all their colleagues look more athletic and become pessimistic that they will ever be able to change that. To better cope with the triggered anger for not having been able to do sports regularly, the comparer might chose to reappraise the situation by reconstructing the outcome as not attributable to oneself (e.g., family commitments left no time for sports). Comparers might also focus on evaluations that would include a dimension that is more congruent to their motives (i.e., tertiary evaluation, see below) and conclude that they are more productive at work than most of the colleagues, which in turn would regulate the negative affect.

The engendered cognitive and emotional reactions must not be treated as a substitute of the comparison outcome or as a measurement of the utility of upward or downward comparison. Downward and upward comparisons might sometimes lead to similar affective reactions. Whereas downward comparisons often lead to positive affect, upward standards might also lead to positive affect if the standard represents an appetitive and attainable end state. In this respect, it is useful to make a distinction between immediate emotions and expected emotions (Loewenstein et al., 2001). Expected positive emotions may decrease both negative affect after upward comparisons and positive affect after downward comparisons. This might also strengthen addictive behavior change, such as demonstrated with smokers who preferred upward social comparisons regarding quitting (Gerrard et al., 2005). Furthermore, short-term negative affect following an upward comparison might produce persistence on achievement tasks rather than enjoyment tasks (Gibbons et al., 2000). On the other hand, positive affect may produce more persistence on enjoyment tasks rather than achievement tasks. This notion is especially relevant for upward prospective-temporal comparisons that involve vivid imagery and produce positive affect because this might undermine motivation by shifting the focus from the needed tasks toward achieving the goal (Schubert et al., 2020).

Primary, secondary, and tertiary evaluations

The second aspect of cognitive responses relates to the potential need for reevaluation. Motives and engendered reactions determine whether a primary evaluation will be followed by secondary or tertiary evaluations. If relevant needs are satisfied, the comparer will focus on some new activity. The comparison process might also be avoided if comparers perceive it as a threat to their self-concept. However, if relevant needs are not satisfied following the initial outcome and the reactions thereupon, further comparative evaluations might follow. The categorization of the comparative evaluation into primary, secondary, and tertiary evaluations should prove useful in better understanding the process and functions of comparative evaluation. Secondary evaluations are likely to occur if the emotional responses are bearable, the primary motive of comparison is self-assessment or self-improvement, or the comparer is dissatisfied with the comparison outcome of the primary evaluation. To this end, the comparer either continues the comparison to the same standard or makes use of other relevant standards on the same comparison dimension. For example, I might compare my contributions as a researcher with a very successful researcher and perceive the comparison outcome as a threat to my motives and feel sad as a result. To have a better evaluation of my standing as a researcher, I might choose to compare with researchers I have more in common with (e.g., similar background or local proximity).

Tertiary evaluations are undertaken to adjust the consequences of the primary or secondary evaluation. To continue with the above example, my comparison with local colleagues might still lead to a negative evaluation of my standing as a researcher. Given the high self-relevance of this dimension, the comparison outcome conflicts with my perception of my self-concept, which in turn increases my negative affect. To remain at peace with my self-concept, I might be motivated to eliminate the cognitive dissonance and the negative affect and engage in tertiary evaluations. To this end, I might compare my scientific productivity with a dimension that I am better at, such as playing some musical instrument.

Primary, secondary, and tertiary evaluations differ in their aim. Secondary and tertiary evaluations have the specific aim of adjusting the evaluation of the dimension in question or the reactions resulting from that evaluation, respectively. Thus, these two forms of evaluation are rather reflective, whereas primary evaluation can be both automatic as well as reflective. Yet all three forms can be part of the same dual process. The comparison process might start with autonomous comparisons and lead to initial negative or positive reactions. These reactions might then elicit a more elaborate evaluation in the form of secondary or tertiary evaluations. This perspective is in line with a large amount of empirical findings on reasoning, judgment, and decision-making (Evans & Stanovich, 2013).

Comparative behavior over time

The behavior that comparers emit upon engaging in comparisons shapes prospective comparative behavior. Contingent on the consequences of any behavior, appetitive responses are likely to be repeated and aversive responses are not. Relevant long-term consequences with regard to comparative behavior relate to three relevant aspects of prospective behavior: behavioral assimilation, comparative behavior, and target representation. As seen above, self-relevant comparisons to a standard representing an appetitive and attainable end state are likely to lead to assimilation of behavior toward the appetitive end state. However, comparisons with a standard representing an appetitive but unattainable end state will not lead to behavioral assimilation. Note, however, that next to self-relevance and attainability, behavioral intentions will be moderated by other individual (e.g., behavioral costs of working toward the end state or self-monitoring) as well as contextual (e.g., time constraints or external monitoring) variables.

Comparative behavior relates to the extent to which the current behavior during a comparison process affects prospective behavior with comparison standards. If a comparer reacts with intense affect upon comparison to an appetitive (or aversive) standard being perceived as representing an unattainable (or unavoidable) end state and therefore decides to abandon the comparison process altogether (see Fig. 1), this increases the likelihood that the comparer will avoid this particular comparison in the future. Finally, every exposure to comparison standards may affect the posterior representation of the target dimension relative to the representation before the exposure. However, this issue has been neglected so far and remains to be investigated in future research.

Antecedent factors of the comparison process

Contextual and personal factors influence the comparison process. Contextual variables consist of environmental conditions and ongoing social interactions, and they influence the initiation and progression of the comparison process. This is primarily done by the influence of the context on the accessibility of information that will affect prospective judgment. In relation to social comparison, research shows that when feedback about the self is manipulated or dissimilarity with the standard is primed, contrast effects occurred (J. P. Gerber et al., 2018). In general, if current features of the context influence the accessibility of information, the evaluation is likely to be context dependent. However, if the contextual features are reflected on, there should be less context dependency (Schwarz & Strack, 1999). Furthermore, as more target information is present, the ability to detect more nuanced potential differences (i.e., evaluation accuracy) increases. At the same time, sensitivity to contextual relevant information decreases.

Individual factors consist of dynamic and stable factors. Dynamic factors may include current information processing, mood, activated needs and goals, and dimension significance. For example, current positive mood or decreased positive affect may stimulate downward comparisons rather than upward comparisons (Suls & Wheeler, 2000), whereas current negative mood may trigger upward dimensional comparisons to increase positive affect (Möller & Husemann, 2006). Stable factors include dispositions, self-concept, basic needs, long-term goals or motives, values, and relevant demographics such as age or gender. For example, Lockwood et al. (2002) reported that promotion-focused individuals are most motivated by role models who stressed strategies for achieving success, whereas prevention-focused individuals are most inspired by role models who stress strategies for avoiding failures. Note, however, that goals are culture-, gender-, and personality-based as well as dimension-specific, and thus, they influence not only the basic comparison outcome but also one's affective, cognitive, and behavioral processes. For example, women are more likely to focus on appearance then men. In addition, antecedents of the comparison process act interchangeably. For example, it has been reported that current negative mood may lead to more upward counterfactuals only in individuals with low self-esteem, whereas individuals with high self-esteem may engage more in downward counterfactuals when in negative mood (Sanna et al., 1999).

Several theoretical models of social judgment can be applied to make predictions about the conditions under which antecedent factors influence the comparison process and outcome. The inclusion/exclusion model (Bless & Schwarz, 2010) proposes that assimilation of contextual influences occurs when features of the contextual information are included into the representation of the judgmental target. Correspondingly, when the target stimulus and the context stimuli are assigned different categories, contrast effects may emerge. The selective-accessibility model by Mussweiler and Strack (1999) is derived from a confirmatory hypothesis-testing framework and suggests that during social comparisons, individuals make a tentative and rapid judgment of similarity or dissimilarity to the comparison standard, with similarity being the default hypothesis. The authors further argued that comparative evaluation can be based on any available information about the target and that the preliminary hypothesis of similarity or dissimilarity influences the cognitive search for information.

Because it is based on social cognition research, this model suggests that comparers initially obtain holistic evaluation-relevant information about the target and the standard, which is then followed by a comparative hypothesis testing that is often limited to the evaluation of a single hypothesis. The initial assessment is followed by selectively searching for evidence indicating similarity or dissimilarity. Research supports the notion that a context that promotes similarity testing (or dissimilarity testing) enables assimilation (or contrast) to the standard (Hanko et al., 2010).

Moderating and mediating factors

Self-relevant comparisons may engage multiple cognitive, motivational, and affective processes. Thus, different variables related to information processing and characteristics of the dimension, standard, and the comparison outcome act as moderating and mediating factors.

Information processing

Comparison processes are usually executed by multiple cognitive processes, including attention, memory, encoding, evaluation, and learning. The extent of involvement depends on the context, trigger of the comparison process, dimensional self-relevance, motivation for comparison, or the comparison standard. The cognitive processes may range from attention-guided comparative evaluation to retrieval of target- and standard-relevant information from memory or the external environment and to valuation of the comparison outcome and engendered reactions. Given its nature as a finite resource, attention can be influenced by a variety of contextual and personal factors. Contextual variables, such as features of the environment that are perceived as threat as opposed to opportunity or the order of information presented by the context (i.e., what is being encountered first), may have a strong effect on attention. Furthermore, the context can provide distractions and cognitive busyness (i.e., the extent to which cognitive processes are engaged by multiple tasks) and thereby affect the comparers' ability for comparative evaluation. Personal factors such as current goals, motives, and mood may also influence attention. For example, current mood may shift attention on features that matter for emotion-appropriate action tendencies.

For the comparer to become consciously aware of the memory that forms the basis for the target representation being compared with a standard, parts of autobiographical memory need to be activated. Yet autobiographical memories are selective and systematically biased (Conway & Loveday, 2015). Comparison outcomes are based on memory accessibility that subsumes notions of salience for externally provided stimuli and retrievability and activation strength for memories and other mental objects (Kahneman, 2003). In their decision-by-sampling model, Stewart and colleagues (2006) argued that attribute values are compared with a decision sample comprising a sample of values from memory and that the distribution of values in memory reflects the distribution of attribute values in the given context. Research also suggests that initial judgment tendencies are time-dependent such that early-emerging favorites are bolstered in being interpreted as more valid than later options (D. Simon et al., 2004). Even when evaluating a single option, attribute evaluations are biased to favor the initial disposition, supporting the notion that information distortion is one cause of primacy effects in judgment (Bond et al., 2007). Accordingly, information that is chronically or temporarily most accessible will have the strongest impact on the comparison outcome. Likewise, with each access, the specific part of the memory will become easier to access for future reference.

It is particularly the interplay between characteristics of associative memory (i.e., a network of memory for semantic information, affect, and goals) and contextual information that influences which parts of memory are activated. As described above, the activation and overweighting of hypothesis-consistent information in memory influences the search for similarity testing. Of particular interest here are the three features of associative memory summarized by Morewedge and Kahneman (2010): associative coherence, attribute substitution, and processing fluency. Associative coherence is given when certain contextual or personal stimuli evoke a self-reinforcing pattern of reciprocal activation in associative memory. The activation of similarities with an upward appetitive standard leads to a focus on subfeatures of the target dimension that are more likely to be perceived as similar, and this focus activates an overall perception of similarity. The attribute substitution hypothesis suggests that evaluation of central features of the target dimension automatically activates the evaluation of peripheral characteristics of the standard. This hypothesis explains findings in social comparison that sharing an identity relationship with the standards (i.e., a peripheral similarity) enhances assimilation to social standards. Finally, processing fluency suggests that information that is perceived as coherent and easy will easily lead to assimilation.

Affect

Affective processes influence people's evaluative behavior. Affective states preceding the basis comparison process and those emerging during the comparison process contribute to the initiation of the comparison process, the selection of the comparison standard, as well as the

comparison outcome. Affect may serve as a source of information that gets incorporated into the evaluation or increase the accessibility of affect-congruent information in memory (Schwarz, 2011). As an example, a sad mood can lead to increased salience of dissimilar characteristics of the target dimension in comparisons at issue. Furthermore, and as postulated by the dual-system framework of reasoning (Evans & Stanovich, 2013), emotions influence the extent to which an intuitive system and an analytic contribute to judgment. In addition, incidental feelings (i.e., unrelated to the comparison in question) may be misattributed to having been elicited by the comparison standard, and thus, they may also affect the comparison outcome (Schwarz, 2011). Moreover, positive affective states reinforce one's current mode of thought, whereas negative affective states may do the opposite (Eldar et al., 2016). Research further suggests that depressive mood is associated with greater sensitivity to negative information (Korn et al., 2014), and thus, mood can influence judgment about unrelated stimuli (Eldar et al., 2016). In fact, the frequency and nature of comparisons might be different in individuals with mood disorders relative to healthy individuals (McCarthy & Morina, 2020). Finally, and as indicated above, elevated affective reactions that accompany self-relevant comparisons influence immediate as well as long-term behavioral reactions.

Target and standard characteristics

Two sorts of characteristics of the target and standard influence the comparison process. First, general properties of the target dimension, such as the scope or novelty of the dimension, are likely to have an impact on the comparison process. Narrow dimensions, and especially homogeneous ones such as body height or income, require less assessment criteria and can be more precisely processed than broad dimensions. Likewise, frequently assessed dimensions are more likely to be executed automatically than novel dimensions and involve weaker engendered affective reactions. Second, the comparison process is affected by perceived self-relevance, similarity between targets and standards, controllability, and self-efficacy.

The degree to which the comparison dimension is central to one's self-evaluation is of key importance. Highly self-relevant dimensions are likely to frequently involve comparisons, include high levels of cognitive elaboration during the comparison process, and be accompanied by subsequent strong emotional, cognitive, and behavioral reactions. The reactions are likely to be higher in the case of contrast to (or assimilation with) an appetitive (or aversive) outcome. Dimensions that are not central to one's self-evaluation will rarely lead to comparisons, and when they do, they might involve low levels of cognitive elaboration and easily include cognitive processes not directly linked to comparative evaluations, such as imagining how life would be if one possessed the attribute or outcome that the standard represents (Markman & McMullen, 2003).

Perceived similarity between targets and social standards has been tied to the subjective assessment of shared circumstances with the comparison standard (Collins, 1996). However, it should prove practical to distinguish between the similarity directly tied to the attributes of the comparison dimension and the similarity related to attributes beyond the comparison dimension (i.e., attributes such as shared group membership, broad personality traits, or similar contextual features). The former might be labeled *central similarity* and the latter *peripheral similarity*. Central similarity points to the perceived distance between the target representation and the standard representation and can be influenced by peripheral similarity. Research on social comparison indicates that a self-defining peripheral feature may influence comparers to perceive themselves closer to others. Sharing an identity relationship with the standard, such as in-group membership, may enhance assimilation to both upward and downward standards (McFarland et al., 2001). Assimilation may occur even if broad features such as shared birthday are activated, as was reported by Brown et al. (1992), who investigated women's self-assessment of attractiveness in comparison with pictures of highly attractive women. However, the effect seems to be dependent on the level of self-categorization and only if the group level identity is salient (Brewer & Weber, 1994).

With increasing perceived central dissimilarity between the target and standard (i.e., contrast), the impact on affective, cognitive, and behavioral reactions will increase. However, up to a point, dissimilarity will be perceived as too strong, and from that point on, increasing dissimilarity will have less impact on comparative behavior. Essential in this regard is the interplay between central similarity or dissimilarity, self-relevance, and the perceived controllability or malleability of the outcome associated with the standard. Controllability relates to the degree to which one thinks that the attribute can change over time and the appetitive (or aversive) outcome is attainable (or preventable). Assuming perceived controllability, the notion of self-efficacy becomes relevant (i.e., individuals' belief in their capacity to execute behaviors necessary to reduce any distance to appetitive standards by producing specific performance attainments). Attainment represents a subjective probability that mathematically can be represented as bounded between 0 and 1. A value of 0.5 is the point of maximum uncertainty (i.e., 50% chance),

0 indicates that attaining the standard outcome is impossible, and 1 indicates that the outcome is certain. The general principle is that self-relevant comparison standards that represent an appetitive (or aversive) outcome that is being perceived as attainable (or avoidable) will maintain behavior toward the desired outcome (i.e., behavioral maintenance) or produce new action tendencies in the desired direction (i.e., behavioral assimilation).

However, a self-relevant comparison standard that represents an appetitive (or aversive) outcome that is being perceived as unattainable (or unavoidable) might lead to different behavioral consequences. Perceived unattainable appetitive outcomes might either produce no new action tendencies (i.e., behavioral quiescence) or perhaps "boomerang" action tendencies, such as reducing or quitting on efforts to work toward achieving an outcome. Perceived unavoidable aversive outcomes, on the other hand, might also lead to new action tendencies toward better coping with the outcome in question rather than toward avoiding the aversive outcome. For example, a 60-year-old individual who compares with an older friend with hearing loss might choose to gather information about hearing aid devices.

Individual types of comparison standards might have additional specific characteristics. For example, social comparison can occur proximally through affiliation or contact with a comparison standard or distally by receiving information about the comparison standard (e.g., written information). These two different modes may be processed differently and thus lead to different reactions and consequences (Taylor & Lobel, 1989). Proximity with respect to social comparison further relates to geographical distance. Local information is often perceived as more relevant for self-evaluation than distant information (Zell & Alicke, 2013). For example, the big-fish-little-pond effect demonstrates that academic self-concept is lower in high schools with high average ability levels than in high schools with low average ability levels (Jonkmann et al., 2012). Proximity with regard to temporal comparison relates to temporal distance and is also characterized by category boundaries, such as finishing school or being exposed to extraordinary events (Schwarz & Strack, 1999). With respect to counterfactual comparisons, closeness of an outcome that might have happened (or not) as well as salience of hypothetical outcomes influence the frequency and nature of counterfactual comparisons (Kahneman & Miller, 1986).

Implications and Future Directions

Several authors have argued that social comparisons are ubiquitous and influence behavior. Nonetheless, psychology as a field has underestimated the role of different types of comparison in shaping self-perception. This argument is based on both the quantity and nature of current research on comparative thinking. Apart from social comparison, there is a great shortage on research on the role of different types of comparison in self-perception. Yet even with respect to social comparison, there is lack of research in areas other than social psychology. For example, perceptions of mental health complaints are likely to be influenced by social comparisons. However, a recent systematic review on social comparison in depressive and anxiety disorders, which are by far the two most prevalent groups of mental disorders, revealed that there is complete lack of observational prospective research with clinical populations and that only two experimental studies have been conducted with patients with depression and none with patients with anxiety disorders (McCarthy & Morina, 2020).

Furthermore, the paradigms used in research on social comparison in social psychology and beyond have mainly focused on structure of comparison, and research on how comparative thinking shapes the formation, maintenance, and alteration of self-perceptions is lacking. This raises the question of why we, as scholars, have underestimated the role of comparative thinking. I argue that comparisons are such an integral part of judgment that scholars have failed to notice their profound impact on self-perception. For if people elaborate on the role of comparisons in their daily lives, they must conclude that they may be the driving force of their perceptions. Individuals think of themselves as good looking, confident, kind, articulate, hardworking, or rich if they believe that they score higher on these attributes than most other people. Likewise, individuals may think of themselves as stupid, inhibited, shy, depressed, or inflexible relative to other people or to past times.

Moreover, people's evaluations of their own skills, traits, and possessions are relative and depend on their frame of reference. I might usually think that my looks are just fine and that I am a kind person and hardworking. Yet a comparison to the appearances of my next-door neighbor and George Clooney make me doubt my own looks, and comparisons to my own father make me doubt my kindness and hard work. More importantly, several empirical studies point to the crucial role of comparisons on long-term behavior. For example, instructions to compare one's behavior with high-achieving fellow students are associated with disengagement from relevant coursework (Rogers & Feller, 2016), and descriptive norms interventions influence towel reuse in hotels (Goldstein et al., 2008), voting behavior (A. S. Gerber & Rogers, 2009), and charitable giving (Frey & Meier, 2004).

The proposition that comparative thinking is the driving force of one's perceptions requires that comparative thinking be defined and investigated as an active, unfolding process. Social comparison has been defined as a process comprising (a) seeking or encountering social information, (b) thinking about the social information in relation to the self, and (c) reacting to social comparison on the cognitive, affective, or behavioral level (Wood, 1996). The gCOMP model represents an extended process model of comparative thinking that applies to different types of comparison. The extension comprises three new major proposals.

First, the gCOMP proposes that the basic comparison process—the [b] component in Wood's (1996) definition—consists of three variables: (a) prior target representation, (b) standard representation, and (c) the integration of the first and second components representing the comparison outcome. The model assumes a temporal order in that the comparison outcome is a result of the integration of two primary informational inputs. To understand the role of comparison in self-perception, it is crucial that researchers gather knowledge about the prior target representation. The gCOMP proposes that for self-relevant target dimensions, broad (vs. narrow), novel (vs. familiar), and minimally self-relevant (vs. highly self-relevant) target representations represent a higher degree of prior uncertainty and are more likely to be updated from the prior representation to the posterior representation. In addition, the impact of central similarity to the standard on the posterior target representation is curvilinear: There are small updates when central similarity is very high or very low but large updates in between these extremes. However, only high (vs. low) peripheral similarity is associated with large updates. A better understanding of how thinking about the standard information is integrated into target representation will enable developing and testing theoretical predictions with respect to how comparisons influence self-perception. Research in cognitive psychology has a long tradition of investigating how the presentation of novel stimuli are integrated with prior knowledge (Hogarth & Einhorn, 1992). The Bayesian framework might prove useful in understanding how the prior target and standard representations are integrated to generate a response (Oaksford & Chater, 2020). The Bayesian models have been successfully applied in such fields as anchoring effects (Turner & Schley, 2016), semantic memory (Steyvers et al., 2006), and language acquisition (Chater & Manning, 2006).

Second, and drawing on the rich tradition of appraisal theory, the framework proposes that valuation is the engine that shapes short- and long-term responses following the comparison outcome. If the motivational meaning is computed as irrelevant, consonant, or challenging but controllable, the operation of a regulatory valuation system has a shorter duration. If, however, the computed discrepancy between the desired and actual outcomes is perceived as a threat, the valuation system is active for an extended period of time, and significant regulatory efforts need to follow. Here the distinction between first-order and second-order valuation systems proves useful (Sheppes et al., 2015). The former represents the computation of discrepancies between the desired and actual outcomes and translates into emotion generation. Its output then activates a second-order valuation system, which ascribes engendered emotions negative or positive value and may initiate regulation strategies. The current approach enables the examination of the role of the valuation systems in regulating comparison outcomes and shaping short- and long-term responses. In addition, it facilitates the examination of how the valuation system changes over time and in what ways the mechanisms underlying comparison processes differ from other forms of valuation. Information processing and appraisal theories can be applied to examine the basic elements of the valuation process (Oppenheimer & Kelso, 2015). The appraisal and emotion-regulation research informs us how emotion-regulation tasks can be used to directly manipulate valuations when examining causal appraisal-emotion relationships. For example, after exposure to comparison standards, participants can be instructed to regulate their emotion by changing specific appraisals.

Third, the proposition that valuations of the comparison outcome as threat may also lead to rededication and reconstrual in addition to distraction has further relevant implications for future research. Novel empirical work is needed to examine the features and frequency of rededication and reconstrual as well as the factors that influence them. It is expected that reconstrual is preferred when the peripheral similarity is low (e.g., "He is more productive then I am because he has no children to take care of"), whereas rededication may be mandated when the self-relevance of the comparison dimension is low (e.g., "I mustn't bother about my looks at my age"). Furthermore, reconstrual may occur when the target dimension is novel and more prone to a biased comparison outcome, whereas rededication might occur more often when the target dimension is frequently assessed. Distraction, on the other hand, is likely to occur when both peripheral similarity and self-relevance are high and the novelty of the dimension is low. Future research needs to investigate the effects of reconstrual and rededication on the target representation, emotions, and long-term behavior. Experimental research should further examine under which conditions reconstrual or rededication are more

likely to occur if distraction is instructed not to occur. In addition, prospective research may examine reappraisal manipulations targeting different appraisal dimensions such as relevance, valence, controllability, likelihood, and coping capability. The gCOMP can furthermore be used to investigate how prior target representations influence reappraisal and how repeated patterns of reappraisal can contribute to durable change in target representations and motives.

A better understanding of how comparative behavior shapes mental and physical attributes constituting the self has significant implications for applied fields such as mental health. Understanding the antecedents and consequences of the appraisal strategies can pave the way for improving assessment and treatment of mental health complaints. We, as researchers, first need to develop valid tools to assess the nature and frequency of comparative thinking, the valuation of the comparison outcomes, as well as the valuation of the engendered emotions. Furthermore, we need valid tools to assess appraisals before and after individuals engage in reappraisal tasks to come to know about the scope and nature of reappraisal methods used. This will increase our knowledge of the role of comparative thinking and behavior in the development and maintenance of mental health complaints. An increased understanding of valuation-level regulation outcomes will then help in developing novel interventions that target dysfunctional comparative thinking and appraisal strategies to improve psychological well-being. Such interventions can revert to the knowledge gathered from programs aimed at modifying goal or value orientations (Priniski et al., 2019) or dysfunctional emotion regulation (Sheppes et al., 2015).

Concluding Remarks

Comparisons inform people about their current selves and their progress toward end goals. Comparative evaluations are omnipresent in everyday life, appear both unintentionally and intentionally, and are context sensitive. The current framework defines comparison as a dynamic process consisting of several subcomponents. The segmentation of the subcomponent processes into activation of comparison, basic comparison process, valuation, as well as emotional, cognitive, and behavioral responses is not rigid; however, the taxonomy should prove conceptually useful because it breaks down the comparison process into testable constituent subprocesses. A better understanding of comparative behavior processes will enhance the knowledge of self-perception and help identify effective strategies that promote more adaptive comparisons.

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