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Subjective Importance as a Cue for Self-Reference

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Abstract

We investigated whether people's judgments of self-reference could be influenced by cues of importance. Our investigation builds on evidence that information related to the self is processed in specialized ways and that implicit attributions affect how stimuli are interpreted. We hypothesized that the more important a trait descriptor was, the more likely participants would be to misremember it as having been presented in a self-referential manner. This hypothesis was tested using a source-memory task; subjective ratings of importance served as predictors of accuracy. In two experiments, logistic multilevel analyses supported our predictions, indicating that people use cues of importance when deciding if stimuli are self-referential. The results show that people do not rely solely on valence when making self-referential judgments; importance also can bias self-referential attributions. These findings have implications for social and autobiographical memory, including how people may assign responsibility for jointly produced actions.

Keywords

self-referential information, attributions, memory, source monitoring

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The self, and our concept of the self as an entity, is essential to how we interpret and interact with the external world. Stimuli related to the self elicit specialized processing in a variety of contexts (e.g., Fenigstein, 1984; Greenwald, 1980; Symons & Johnson, 1997). However, persisting questions pertain to how individuals draw boundaries between the self and the world around themselves; and how characteristics of a stimulus in the environment influence interpreting information in regard to the self. The present studies seek to investigate one manner in which individuals may draw boundaries of the self, pointing to implicit cues that may guide the likelihood that information will be perceived as self-referential.

Self-referential information receives specialized processing, generally characterized by a bias toward attending to it. Greenwald (1980) theorized that people have egocentric biases, which influence how they interpret new information and remember old information. Empirical work has supported this view, showing that individuals are prone to over-perceiving themselves as the target of others' attention and behavior (Fenigstein, 1984; Gilovich, Medvec, & Savitsky, 2000; Zuckerman, Kernis, Guarnera, Murphy, & Rappoport, 1983). In addition, meta-analyses provide robust evidence of a self-referential memory effect, characterized by better memory for information encoded in reference to the self than in reference to another target or to stimulus characteristics, such as upper or lower case text (Symons & Johnson, 1997). Furthermore, as demonstrated in the highly influential "cocktail party" phenomenon, self-referential information (e.g., a person's name) captures an individual's attention with little cognitive effort (Cherry, 1953).

Despite extensive evidence that self-referential information receives specialized processing and that people are biased to perceive self-referential links between themselves and external stimuli, the processes by which these biases form are not fully understood. People are prone to making self-referential attributions, and it is an open question what cues they use to distinguish between self-referential and other-referential information. One cue for discriminating whether or not information is self-referential may be the valence of an event or item. Extensive evidence suggests that people generally hold unrealistically positive self-views (e.g., Matlin & Stang, 1978) and are disproportionately attracted to positively valenced self-referential feedback (Bernichon, Cook, & Brown, 2003). However, if people only took note of the self-relevance of positively valenced events, they would miss potentially useful information. Moreover, people do not appear to desire viewing themselves in an exclusively

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positive manner; people also appear to desire relatively accurate self-referential information (e.g., Festinger, 1954; Trope, 1986) and information that is consistent with their self-views (e.g., Swann, 1997, 2011). To develop and maintain somewhat accurate and consistent self-views, then, people must rely on cues beyond valence when interpreting information. We propose that an additional cue people use in making self-referential attributions is the importance of an event, item, or stimulus, with greater importance leading to more self-referential attributions.

Our proposal builds on previous investigations of the role of (mis)attributions in judgment across a range of domains. In a classic example, Dutton and Aron (1974) found that arousal due to crossing a shaky bridge was misattributed as attraction to the experimenter greeting participants at the end of the bridge. Schwarz and Clore (1983) found that current mood, as a function of present weather conditions, affected participants' judgments of life satisfaction. The ease with which new information is processed also influences the attributions people make. C. M. Kelley and Jacoby (1990) found that as a sense of familiarity with stimuli increased, so did the likelihood that the stimuli would be judged as having been encountered previously. Processing fluency also influences affective attributions, resulting in people rating a product as pleasurable if its label is easy to read (Gmuer, Siegrist, & Dohle, 2015).

People also rely on attributional processes when attempting to recall the source from which information originally was acquired. This process, termed *source monitoring*, typically happens rapidly and without deliberation, based on the types of details activated in memory (Johnson, Hashtroudi, & Lindsay, 1993). More specifically, memories vary in the amount of contextual and phenomenological information they contain, and these differences can be used to establish criteria for making source judgments (Johnson et al., 1993). Relative to recalling semantic memories, making source judgments depends on more extensive neural processing (Cansino, Maquet, Dolan, & Rugg, 2002) and suffers from larger decrements in accuracy across time (Yonelinas, 1999). Another example of this general phenomenon is the sleeper effect, whereby information from a discredited source is later remembered as truthful because the source memory has degraded to the point that it no longer can be retrieved easily (Cook & Flay, 1978). Failures of source monitoring also can lead to a variety of misattributions, including false eyewitness testimonies (Zaragoza & Lane, 1994).

The present studies sought to build on findings from the literatures on attributional processes and on the special processing that self-referential information receives, to elucidate conditions under which information is likely to be interpreted as self-referential. More specifically, we investigated whether the subjective importance of a stimulus would influence the likelihood that it would be interpreted as self-referential. We hypothesized that because the self is important and influences information processing in egocentric ways, an important event, absent explicit contextual cues for attribution, is more likely to be interpreted as self-referential. When applied to memory, this hypothesis suggests there should be better accuracy for important stimuli encountered in relation to oneself and lower accuracy for important stimuli encountered in relation to someone else. To test this claim, the following studies operationalized importance in two ways: on the basis of subjective ratings from each participant and on the basis of normative ratings collected in a separate sample.

There is evidence for a dissociation between the effects of normative importance and subjective importance on self-evaluative judgments (Hardy & Leone, 2008; Hardy & Moriarty, 2006; Pelham, 1995b, 1995b), with some findings suggesting that subjective importance is more predictive of outcomes such as self-esteem (e.g., Hardy & Leone, 2008; Hardy & Moriarty, 2006; Pelham, 1995a, 1995b), but other findings suggesting that normative importance is more predictive (Marsh, 1993, 1995, 2008; Scalas, Marsh, Nagengast, & Morin, 2013). Therefore, both forms of importance were included to test whether importance can serve as a predictor of self-referential processing. Study 1 was the initial test of the hypothesized effect; Study 2 was a close replication, in which we varied the order participants completed the subjective importance task and the other tasks.

In these experiments, participants first judged whether or not some trait attributes were descriptive of themselves and whether or not other trait attributes were descriptive of another person. Participants later recalled the context in which they earlier encountered each trait attribute. In line with the attributional nature of making source-memory judgments, we predicted that participants' source memories would reflect a bias, such that important items more often would be (mis)remembered as having been encountered in relation to oneself rather than in relation to another target. We hypothesize that participants use importance to make self-referential source attributions because they use importance as an indicator that they encountered the word previously in a self-referential manner. Support for this hypothesis would indicate that people's recollections of their past actions are determined partly by their subjective responses to cues, leading them to misrecollect having taken actions they did not take (overreporting instances of rating oneself on important attributes) and having not taken actions that they did (underreporting instances of rating oneself on unimportant attributes).

Method

Participants

Seventy-nine Stony Brook University undergraduate students participated in Study 1, and an additional 96 participants, who did not complete the first experiment, participated in Study 2. One participant was excluded from Study 1 due to incomplete data, and an additional four participants were excluded from Study 2 due to incomplete data. Sample size was determined beforehand to comprise a minimum of 80 participants in each study, which we presumed to afford sufficient statistical power given the many repeated measures we recorded per participant. We report all independent and dependent variables and all possible data exclusions. All experimental procedures were approved by the internal review board at Stony Brook University.

Materials

All methods were identical in Studies 1 and 2, with the single exception that the order in which the first and fourth tasks (described below) were counterbalanced across participants in Study 2.

Participants completed five different tasks on a computer. They were asked to make a variety of judgments about a set of 160 adjectives. The adjectives were presented on a computer screen, in white text on a black background in 28-sized Arial font. Stimuli were presented via DirectRT Precision Timing Software, Version 2004.3.0.27, © Empirisoft. Participants were seated in small individual rooms and asked to indicate their answers via button presses on a keyboard.

Normative Importance Ratings

A list of 180 potential adjectives participants might see were compiled from a list of 555 adjectives rated on likableness (Anderson, 1968). Mean normative ratings of importance for each adjective were calculated by having a different set of participants ($N = 136$) respond to the following question on a scale of 1 (*not very important*) to 5 (*extremely important*):

> We are interested in learning which characteristics about a person are important in getting to truly know someone. Please rate the following words on how important they are when getting to know someone closely. These characteristics may be positive or negative traits, as long as they are important to knowing someone.

The set of 180 words was split into eight lists, randomly generated, and each participant provided ratings on 45 to 46 words. The mean ratings for normative importance were calculated for each word. To validate the ratings of importance, each word's likableness rating was first converted to the absolute difference from the mean on likableness. Next, the absolute difference from the mean on likableness and the mean importance ratings were correlated to try to assess whether the importance ratings were valid measures. The Pearson r was .68, $p < .001$. Based on the normative importance ratings and their correlation with the absolute difference on likableness, we performed a mean split to create a list of "low-" importance words and a list of "high-" importance words.

Procedure

Participants first completed an encoding task, in which they saw 88 adjectives preceded by the cue "SELF" or "DEPP," referring to the actor Johnny Depp. Using a famous person as an "other" target is in line with previous work on the self-referential memory effect, which used famous people such as George W. Bush, Ronald Reagan, Johnny Carson, Walter Cronkite, and Jimmy Carter (Kelley et al., 2002; Symons & Johnson, 1997). A close or familiar other was excluded as a potential other target in the design stage due to the documented confusions between the self and close others (Mashek, Aron, & Boncimino, 2003) and to the positive illusions associated with close others (Murray, Holmes, & Griffin, 1996). The first eight trials in this task used items drawn from a practice list of 10 words, also from Anderson's (1968) list of 555 adjectives; these eight items were not used as targets in the experiment or presented again, thus precluding any analyses of data related to the practice trials. Half of the 40 words seen with the cue "SELF" were drawn randomly without replacement from the low-importance list, and half were drawn randomly without replacement from the high-importance list; the same random selection and 20/20 split between high and low importance was present for the "DEPP" cue, for a total of 80 words across targets and importance levels. Johnny Depp was chosen because we believed, based on pilot testing, that he would be relatively well known and neutrally liked across participants (participants' feelings about Johnny Depp were also measured with an exit questionnaire).

At the beginning of each trial in the first task, participants saw a fixation cross for approximately 200 ms, then a blank screen for approximately 300 ms, followed by the "SELF" or "DEPP" cue for approximately 500 ms, and then an adjective to which they responded "YES"/"NO" to indicate whether the adjective was descriptive of the cue. Participants used the left and right shift keys (counterbalanced across participants) and were asked to make their judgments as quickly and accurately as possible. If participants did not respond within a 2000-ms window, they were presented with a warning screen asking them to respond more quickly.

In the second task, participants completed an old/new recognition memory task. They viewed the original 80 words from the first task, which they had judged for themselves or for Johnny Depp, as well as 80 novel words, which they had not seen. Participants were asked to use the shift keys to indicate as quickly and accurately as possible if the word was new or old. On each trial, they first saw a fixation cross in the middle of the screen for approximately 200 ms, then a blank screen for approximately 300 ms, followed by an adjective for 2000 ms. If participants did not respond within 2000 ms, they received a warning asking them to respond more quickly. This task was included as an attempt to check that the participants were paying attention and encoding the target words during the first task, as well as to provide a delay period for the upcoming source-memory task.

During the third task, participants completed the source-memory test for the original set of 80 words. Participants saw the set of words from the first task again, and they were asked to indicate whether they had originally seen the adjective preceded by the cue "SELF" or "DEPP." Participants indicated their responses with the left/right shift keys and were instructed to take their time in making these judgments. Each adjective was preceded by a fixation cross for approximately 200 ms, a blank screen for approximately 300 ms, and participants had an unlimited amount of time to make a response concerning source.

During the fourth task, participants saw the original set of 80 words one last time and were asked to indicate on a scale of 1 (*not very important*) to 5 (*extremely important*) how important each adjective is in getting to know someone. Before each adjective, participants saw a fixation cross for approximately 200 ms, then a blank screen for approximately 300 ms. As previously noted, in Study 2, the only modification made was to the order of presentation of this task. Approximately half of Study 2's participants (n = 50) completed this task first. The instructions presented to all participants were identical to those used to attain the normative importance ratings. Participants were given unlimited time to make these judgments.

The final task participants completed consisted of answering three questions about the nonself target, Johnny Depp. They indicated how knowledgeable they were about Johnny Depp on a scale of 1 (*not at all*) to 9 (*very much*), M = 3.53 (SD = 1.84) for Study 1, and M = 3.33 (SD = 1.83) for Study 2; and how much they liked Johnny Depp, on a scale of 1 (*not at all*) to 9 (*very much*), M = 5.86 (SD = 2.04) for Study 1, and M = 5.75 (SD = 2.29) for Study 2. They also indicated how close they felt to Johnny Depp, using Aron, Aron, and Smollan's (1992) Inclusion of Other in the Self Scale, which consists of seven pairs of circles varying in amount of overlap, from *not at all* to *almost fully* (M = 1.89, SD = 1.13 for Study 1, and M = 1.95, SD = 1.29 for Study 2). Participants lastly answered a few demographic questions. All responses were made via keyboard button presses.

Results

Means and standard deviations for source accuracy for words rated for the self and Johnny Depp at each level of importance are presented in Table 1 for both Study 1 and Study 2; accuracy was calculated as the proportion of correct answers. Replicating previous work (Symons & Johnson, 1997), in both Study 1 and Study 2, support for the self-referential memory effect was found; participants had reliably better recognition memory, correctly identifying previously presented words as "OLD," for words they encoded for the self compared with words they encoded for Johnny Depp. In Study 1, the mean recognition accuracy (as proportion correct choice of "OLD") for "SELF" words was 0.78 (SD = 0.42), whereas the mean recognition accuracy (as proportion correct choice of "OLD") for "DEPP" words was 0.69 (SD = .46), paired-samples $t(78)$ = 7.01, p < .001. In Study 2, the mean recognition accuracy (as proportion correct choice of "OLD") for "SELF" words was 0.77 (SD = 0.42), whereas the mean recognition accuracy (as proportion correct choice of "OLD") for "DEPP" words was 0.70 (SD = .46), paired-samples $t(95)$ = 7.50, p < .001. Furthermore, reaction times were comparable for both "SELF" and "DEPP" words when evaluated in terms of self-descriptiveness. In Study 1, participants took approximately 967.94 ms (SD = 343.97) to make "YES"/"NO" descriptiveness judgments for Depp words, and approximately 941.13 ms (SD = 344.47) for self words. In Study 2, participants took approximately 968.45 ms (SD = 337.20) to make "YES"/"NO" descriptiveness judgments for Depp words, and approximately 933.61 ms (SD = 313.27) for self words.

Table 1. Means and Standard Deviations for Source Accuracy (Correct SELF or DEPP Choice) as a Function of Encoding Source and Importance Rating Given for Studies 1 and 2.

Encode self		Encode Depp	
Rating	Source accuracy, *M* (*SD*)	Rating	Source accuracy, *M* (*SD*)
Study 1			
1	0.57 (0.50)	1	0.66 (0.47)
2	0.65 (0.48)	2	0.67 (0.47)
3	0.66 (0.47)	3	0.60 (0.49)
4	0.67 (0.47)	4	0.61 (0.49)
5	0.66 (0.47)	5	0.62 (0.49)
Study 2			
1	0.46 (0.50)	1	0.66 (0.47)
2	0.58 (0.49)	2	0.68 (0.47)
3	0.62 (0.48)	3	0.62 (0.48)
4	0.63 (0.48)	4	0.59 (0.49)
5	0.67 (0.47)	5	0.61 (0.49)

Data Structure

Normative ratings of importance were entered as the means attained for each word when it was normed in a separate sample. In Study 1, analyses using normative ratings to predict source-memory accuracy did not support our hypotheses, whereas analyses based on subjective ratings of importance did support our hypotheses (as detailed below). Therefore, we conducted Study 2 as a near-exact replication to examine whether the relationship between subjective importance and source accuracy was replicable. Given a lack of consistent results based on normative importance in Studies 1 and 2, those results are not pursued further in this article (but are reported instead in the accompanying Online Supplementary Materials). The analyses presented below will focus on the role of subjective importance ratings. All materials and data for Study 1 and Study 2 are available at osf.io/sgg8z.

For the analyses using subjective ratings of importance, mean importance ratings were rescaled into within-subject mean deviation scores, which allows examination of whether the particular items that a particular subject evaluates to be highly important are more likely than other items to be rated by that subject to be self-referential. To accomplish this, the grand mean for importance was first calculated and subtracted from all importance ratings (yielding $M = 0$, $SD = 1.340$, range = −2.283 to 1.717, in Study 1, and $M = 0$, $SD = 1.318$, range = −2.418 to 1.582 in Study 2). Finally, two orthogonal components were created: one that reflected the between-subject means, calculated as a subject-specific mean based on importance ratings given for all adjectives rated for each person (Study 1: $M = 0$, $SD = 0.473$, range = −0.883 to 1.317; Study 2: $M = 0$, $SD = 0.548$, range = −1.880 to 1.432), and one that reflected the within-subject deviations from that mean, calculated as the individual ratings minus the grand mean, minus the between-subject mean (Study 1: $M = 0$, $SD = 1.254$, range = −3.600 to 2.600; Study 2: $M = 0$, $SD = 1.199$, range = −3.850 to 2.663).

The between-subject mean was created to allow for the separation of between-subject and between-item effects from within-subject variations in importance ratings. The between-subject mean captures differences between participants' average ratings or average item effects because it is the mean rating for each participant across all items they rated. The within-subject centered mean therefore captures the remaining variance that cannot be accounted by different overall average ratings on items for a particular person, or for the sample at large (due to the subtraction of the grand mean from the individual ratings). Therefore, each item is scaled to reflect a person's deviation from his or her own mean ratings (between-subject mean) and from the grand mean. This centering allows for a more precise measure of within-person rating fluctuations compared with grand mean centering alone (Bolger & Laurenceau, 2013); in this way, the within-person centering allows analysis of whether the particular items that a particular participant rates as highly important also are most likely to be remembered by that participant as having been encountered in a self-referential context.

Original encoding source was coded as 0, signifying "DEPP," and 1, signifying "SELF." Valence ratings were created by matching each word with its "Likableness" rating from Anderson (1968), and dividing each rating by 100 ($M = 2.60$, $SD = 1.58$, range = 0.26-5.73). This was done to better match the range of the raw importance ratings attained from participants, given that the Anderson likableness ratings ranged from 26 to 573. The dependent variable, source accuracy, was coded as 0, indicating incorrect, and 1, indicating correct. In Study 2, an additional variable representing task order was coded 0, signifying same order as Study 1, and 1, signifying importance ratings given first.

Hypothesized Models

Hypothesis tests were carried out using multilevel logistic models, due to the categorical nature of the dependent variable. Logistic multilevel modeling (MLM) is ideal for this dataset because it not only best captures the categorical outcome variable of accuracy but also allows estimating person-level effects. One issue found with the use of repeated measures within a set of participants is the increased likelihood that the residual variance is no longer random, but clustered by individuals (Bolger & Laurenceau, 2013; Tabachnick & Fidell, 2012). This results from the fact that individuals tend to give ratings which are more similar to their own ratings than to the overall group ratings. One way to measure the level of nonindependence of errors is by calculating an intraclass correlation. The intraclass correlation for source accuracy, calculated from the Level 2 subject variance and the Level 1 residual variance, was 0.05 for Study 1 and 0.08 for Study 2. Intraclass correlations as low as .05 can lead to inflated Type 1 errors using traditional methods of analysis, resulting from the violation of the assumption of independence of error (Geiser, 2012; Tabachnick & Fidell, 2012). Furthermore, by using each individual subject as a random component, compared with each item in an ANOVA, MLM best captures differences among persons.

The first model included the interaction between original source and the between-subject and within-subject centered ratings of importance, and each main effect, tested separately for Study 1 and Study 2. The within- and between-subject importance ratings and original source and the interaction with source for each type of importance were entered as fixed effects; subjects were entered as random effects. The between-subject centered ratings of importance captures item effects or individual differences among people, whereas the within-subject importance interaction with source is the focal relationship of the first analysis.

To verify that the interaction followed the predicted directions, the overall model was split based on encoding condition and rerun without the interaction terms. Between-subject importance was again included to account for individual differences or item effects, but the estimates for within-subject importance ratings were the focal part of the analyses. Subjects were again entered as random effects, and the between- and within-subject ratings of importance were entered as fixed effects. Finally, to test for the presence of order effects in Study 2 and for valence effects in both studies, the respective variables were entered as moderators of the interactions first tested. All variables entered were fixed effects, and participants were again entered as random effects.

Logistic Multilevel Analyses: Study 1 and Study 2

Study 1. The first model tested source accuracy as a function of between- and within-subject ratings of importance, encoding source (Self = 1, Depp = 0) and the interactions between

Table 2. Fixed and Random Effect Estimates for Study 1.

Fixed effect variables	Estimate (*SE*)	95% CI
Intercept	0.534 (0.060)***	[0.416, 0.651]
Source	0.107 (0.053)*	[0.002, 0.212]
Between-subject importance	0.374 (0.126)**	[0.126, 0.622]
Within-subject importance	−0.120 (0.030)***	[−0.179, −0.061]
Source × Between-Subject Importance	−0.338 (0.112)**	[−0.558, −0.118]
Source × Within-Subject Importance	0.219 (0.043)***	[0.135, 0.303]
Random effect estimates	Variance (*SD*)	
Subject intercept	0.169 (0.412)	
Observations	6,320	

Note. CI = confidence interval.
*p < .05. **p < .01. ***p < .001.

Table 3. Fixed and Random Effect Estimates in Log Odds Form for Study 1 by Source at Encoding.

	Self		Depp	
Fixed effect variables	Estimate (*SE*)	95% CI	Estimate (*SE*)	95% CI
Intercept	0.646 (0.064)***	[0.519, 0.772]	0.538 (0.065)***	[0.410, 0.665]
Between-subject importance	0.043 (0.135)	[−0.222, 0.308]	0.373 (0.137)**	[0.104, 0.643]
Within-subject importance	0.099 (0.030)**	[0.039, 0.158]	−0.122 (0.030)***	[−0.182, −0.063]
Random effect estimates	Variance (*SD*)		Variance (*SD*)	
Subject intercept	0.209 (0.458)		0.220 (0.469)	
Observations	3,160		3,160	

Note. CI = confidence interval.
*p < .05. **p < .01. ***p < .001.

importance and source as fixed effects, and participants as random effects. Estimates and standard errors, in log odds form for all variables, can be found in Table 2. The focal portion of the analysis, the interaction between within-subject centered importance and source, was statistically significant ($\beta = 0.22$, $SE = .04$, $Z = 5.14$, $p < .001$).

To test whether the interaction followed the predicted pattern, with higher source accuracy for self-encoded words as a function of positive deviations from the subject centered mean, and lower source accuracy for Depp-encoded words as a function of positive deviations from the subject centered mean, the above interaction was split by encoding condition, and the interaction terms were eliminated. Estimates and standard errors (in log odds form for all variables) can be found in Table 3. As predicted, for words originally encoded for the self, accuracy increased as a function of increasing importance ($\beta = .10$, $SE = .03$, $Z = 3.26$, $p = .001$). The log odds, transformed to probabilities, indicate a 52.47% base accuracy rate (95% confidence interval [CI] = [50.97%, 53.94%]), which is associated with a 2.47% increase in accuracy for a one-unit increase in within-subject centered importance. As predicted, for the words originally encoded for Depp, accuracy decreased as a function of increasing importance ($\beta = -.12$, $SE = .03$, $Z = -4.02$, $p < .001$). The log odds, transformed to probabilities, indicate a 46.95% base accuracy rate (95% CI = [45.46%, 48.43%]), which is associated with a 3.05% decrease in accuracy for a one-unit increase in within-subject centered importance. Figure 1 shows the effect of importance on source accuracy in terms of raw importance ratings and source accuracy, whereas Figure 2 shows this relationship in terms of predicted source accuracy from the within-subject centered rating of importance and the fixed effects regression line.

To test whether the observed effects were independent of any effect of adjective valence, we simultaneously entered the focal interaction of source and within-subject centered importance alongside the interaction of source and the transformed Anderson Likableness ratings (representing adjective valence). The interaction between source and within-subject centered importance remained significant ($\beta = 0.11$, $SE = .04$, $Z = 2.53$, $p = .011$) while controlling for the significant interaction between source and valence ($\beta = 0.39$, $SE = .04$, $Z = 10.99$, $p < .001$), reflecting a tendency for participants to attribute positive items as having been presented in reference to the self and negative items in reference to Depp, as seen in Table 4.

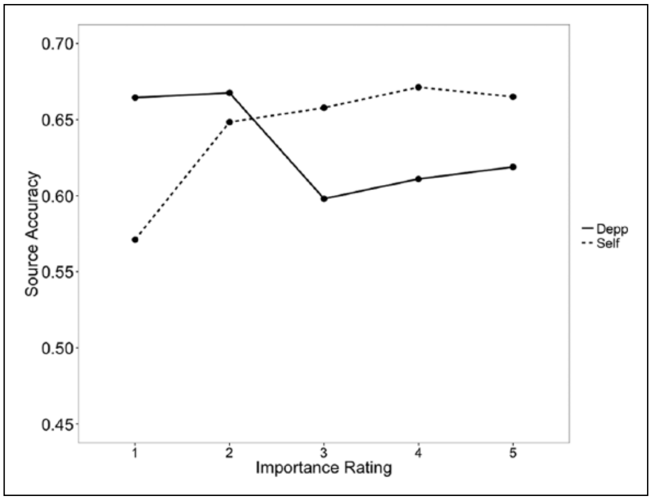

Figure 1. Source accuracy by original encoding condition in Study 1.

Note. The dashed line indicates words originally seen after the "SELF" cue and recalled during the source task as a "SELF" source item. The solid line indicates words originally seen after the "DEPP" cue and recalled during the source task as a "DEPP" source item. The trend seen clearly follows the predicted direction with more important words being ascribed to the self more often for both words originally encoded for the self and for Depp.

Study 2. The first model tested source accuracy as a function of between- and within-subject ratings of importance, encoding source (Self = 1, Depp = 0) and the interactions between importance and source as fixed effects, and participants as random effects. Estimates and standard errors, in log odds form for all variables, can be found in Table 5. The focal portion of the analysis, the interaction between within-subject centered importance and source was statistically significant ($\beta = 0.27$, $SE = .04$, $Z = 6.74$, $p < .001$).

To test whether the interaction followed the predicted pattern, with higher source accuracy for self-encoded words as a function of positive deviations from the subject centered mean, and lower source accuracy for Depp-encoded words as a function of positive deviations from the subject centered mean, the above interaction was split by encoding condition, and the interaction terms were eliminated. Estimates and standard errors, in log odds form for all variables, can be found in Table 6. As predicted, accuracy increased for words originally encoded for the self, and rated more highly on importance ($\beta = .16$, $SE = .03$, $Z = 5.63$, $p < .001$). The log odds, transformed to probabilities, indicate a 54.09% base accuracy rate (95% CI = [52.67%, 55.50%]), which is associated with a 4.09% increase in accuracy for a one-unit increase in within-subject centered importance. As predicted, accuracy decreased for the words originally encoded for Depp, and rated more highly on importance ($\beta = -.13$, $SE = .03$, $Z = -4.06$, $p < .001$). The log odds, transformed to probabilities, indicate a 47.08% base accuracy rate (95% CI = [45.66%, 48.48%]), which is associated with a 2.92% decrease in accuracy for a one-unit increase in within-subject centered importance. Figure 3 shows the effect of importance on source accuracy in terms of raw importance ratings and source accuracy, while Figure 4 shows this relationship in terms of predicted source accuracy from the within-subject centered rating of importance and the fixed effects regression line.

Next, order was included with the initial interaction terms, to test whether the timing of when participants made the importance ratings influenced the interactions observed. When order was included in the initial model, the three-way interaction with between-subject centered importance, source, and order was not statistically significant ($\beta = 0.17$, $SE = 0.19$, $Z = 0.87$, $p > .250$), and most importantly, the three-way interaction with within-subject centered importance and source was not statistically significant ($\beta = -0.03$, $SE = 0.08$, $Z = -0.41$, $p > .250$), suggesting that the order of the tasks cannot account for the observed effects.

Finally, we again tested whether the observed effects were independent of any effect of adjective valence, by simultaneously entering the focal interaction of source and within-subject centered importance alongside the interaction of source and the transformed Anderson Likableness ratings. The interaction between source and within-subject centered importance remained significant ($\beta = 0.17$, $SE = .04$, $Z = 3.97$, $p < .001$) while controlling for the significant interaction between source and valence ($\beta = 0.54$, $SE = .03$, $Z = 16.81$, $p < .001$), again reflecting a tendency for participants to attribute positive items as having been presented in reference to the self and negative items in reference to Depp, as seen in Table 7.

Discussion

The present results indicate that people use cues of importance to help recollect whether or not stimuli were encountered in self-referential contexts. Across two studies, we found that increases in subjective ratings of importance relate to people's memory judgments, resulting in lower accuracy for words seen in reference to others and higher accuracy for words seen in reference to the self. Evidence of this bias was found in the form of a significant interaction between initial source and subjective ratings of importance in both Study 1 and Study 2. Participants were more accurate for self-encoded words evaluated as important and less accurate for other-encoded words evaluated as important (see Figures 2 and 4). Moreover, this effect was independent of the trait valence of adjectives (as assessed in Studies 1 and 2) and of the order of task presentation (as assessed in Study 2). Whereas the analyses including normative importance were inconclusive as to the predictive utility of normed values for importance, these studies establish that subjective importance can be used as a cue for self-referential processing and demonstrate that the effect is replicable.

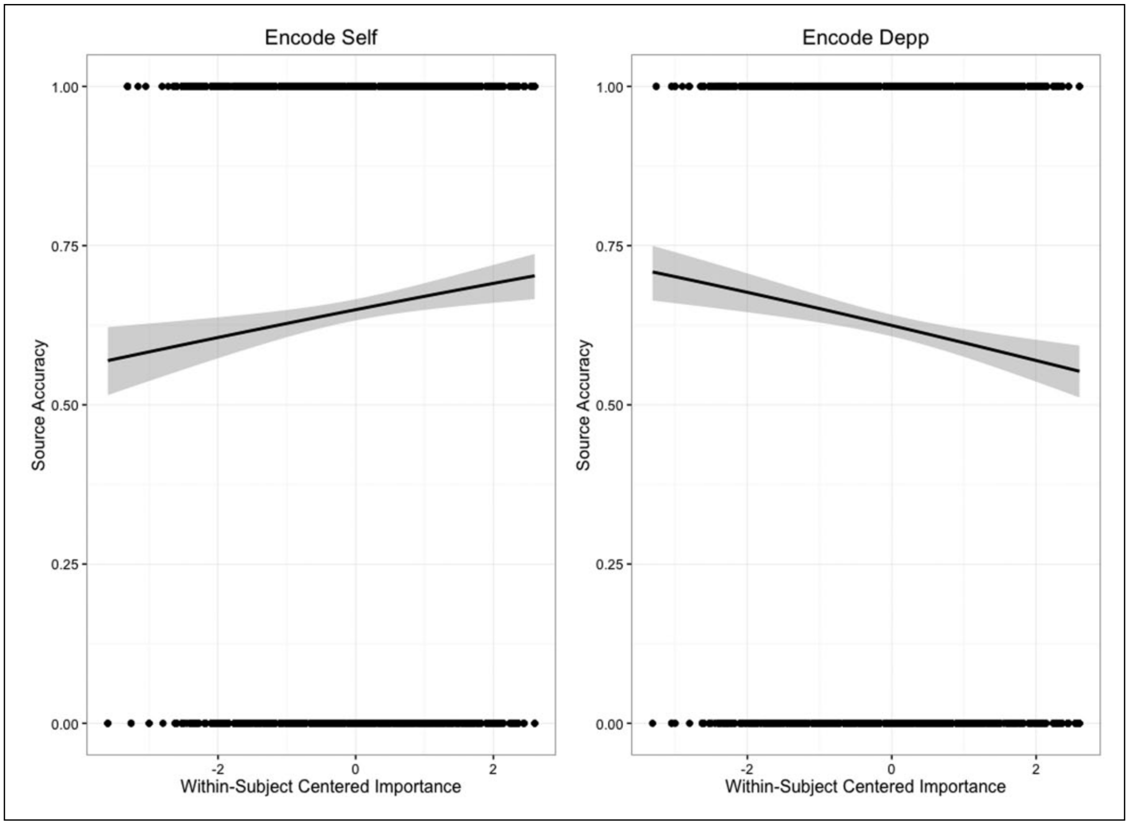

Figure 2. Accuracy by original source and centered within-subject importance for Study 1.
Note. The regression line presented depicts the fixed effect estimates, with a shaded standard error, from the logistic multilevel regression for source accuracy as an outcome of subject centered importance. The pattern supported the predicted effect, with accuracy increasing for the self-encoded words at higher levels of importance, and accuracy decreasing for Depp-encoded words at higher levels of importance.

Table 4. Fixed and Random Effect Estimates in Log Odds for Study 1 With Valence Controlled.

Fixed effect variables	Estimate (*SE*)	95% CI
Intercept	0.976 (0.094)***	[0.791, 1.161]
Source	−0.986 (0.113)***	[−1.208, −0.764]
Within-subject importance	−0.074 (0.031)*	[−0.135, −0.013]
Scaled valence ratings	−0.153 (0.025)***	[−0.202, −0.105]
Source × Within-Subject Importance	0.112 (0.044)*	[0.025, 0.198]
Source × Scaled Valence Ratings	0.390 (0.035)***	[0.320, 0.459]
Random effect estimates	Variance (*SD*)	
Subject intercept	0.178 (0.422)	
Observations	6,320	

Note. CI = confidence interval.
*$p < .05$. **$p < .01$. ***$p < .001$.

We also found that participants demonstrated a valence-based source-memory bias toward recalling encountering positively valenced items in reference to themselves and negatively valenced items in reference to others. We interpret this bias as a source-memory instantiation of the self-serving attributional bias, characterized by people's propensity to associate positive attributes with themselves and negative attributes with others (Gramzow & Willard, 2006; Sedikides & Gregg, 2008). Beyond seeing oneself as possessing more positive attributes than others, the presently documented valence-based bias is the first of which we are aware to show that people also misremember the mere act of judging whether or not they possess positive and negative attributes, overreporting the former judgments and underreporting the latter judgments. Notwithstanding the presence of this self-serving bias, when the interaction between word valence and original source was

Table 5. Fixed and Random Effect Estimates for Study 2.

Fixed effect variables	Estimate (*SE*)	95% CI
Intercept	0.536 (0.061)***	[0.418, 0.655]
Source	−0.044 (0.048)	[−0.139, 0.051]
Between-subject importance	0.112 (0.111)	[−0.105, 0.329]
Within-subject importance	−0.112 (0.0286)***	[−0.168, −0.056]
Source × Between-Subject Importance	0.265 (0.089)**	[0.090, 0.439]
Source × Within-Subject Importance	0.272 (0.040)***	[0.193, 0.351]
Random effect estimates	Variance (*SD*)	
Subject intercept	0.239 (0.489)	
Observations	7,680	

Note. CI = confidence interval.
*p < .05. **p < .01. ***p < .001.

Table 6. Fixed and Random Effect Estimates in Log Odds Form for Study 2 by Source at Encoding.

	Self		Depp	
Fixed effect variables	Estimate (*SE*)	95% CI	Estimate (*SE*)	95% CI
Intercept	0.514 (0.078)***	[0.361, 0.668]	0.540 (0.066)***	[0.412, 0.669]
Between-subject importance	0.040 (0.144)**	[0.123, 0.687]	0.112 (0.120)	[−0.122, 0.347]
Within-subject importance	0.163 (0.029)***	[0.107, 0.221]	−0.127 (0.029)***	[−0.174, −0.061]
Random effect estimates	Variance (*SD*)		Variance (*SD*)	
Subject intercept	0.466 (0.683)		0.297 (0.545)	
Observations	3,840		3,840	

Note. CI = confidence interval.
*p < .05. **p < .01. ***p < .001.

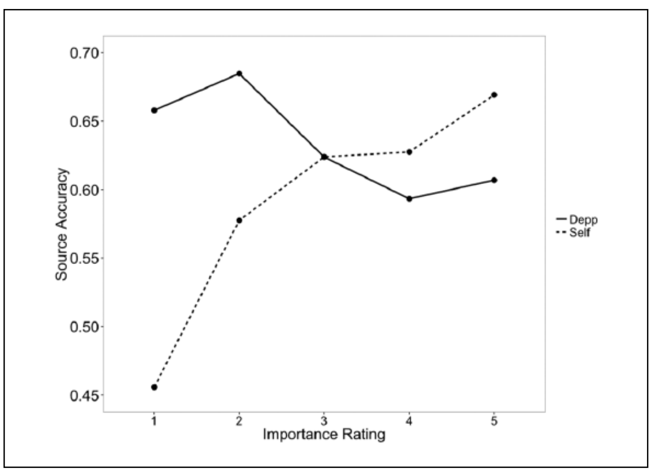

Figure 3. Source accuracy by original encoding condition in Study 2.
Note. The dashed line indicates words originally seen after the "SELF" cue and recalled during the source task as a "SELF" source item. The solid line indicates words originally seen after the "DEPP" cue and recalled during the source task as a "DEPP" source item. The trend seen clearly follows the predicted direction with more important words being ascribed to the self more often for both words originally encoded for the self and for Depp.

included simultaneously with the focal interaction between original source and within-subject centered importance, the interaction between source and importance remained significant. Accordingly, these results indicate that valence and subjective importance independently determine how people decide whether or not information is self-referential.

Furthermore, as can be seen in Figures 1 and 3 and in Table 1, the observed relationship between importance and source accuracy cannot be explained solely as a function of a main effect of overall source accuracy, which was significant in Study 1 only. Across both studies, participants showed decreased accuracy for low-importance adjectives in the self-encoding condition, and increased accuracy for the high-importance words. The opposite pattern was seen for other-encoded words, wherein low-importance words were associated with higher accuracy (reflecting choosing self less often) and decreased accuracy for high-importance words (reflecting choosing self more often). Therefore, it is not the case that participants had overall better source accuracy for words seen in the self-encoding context than in the other-encoding context. In addition, based on the pattern of findings observed, the significant self-referential memory effect found cannot account for the significant interactions observed

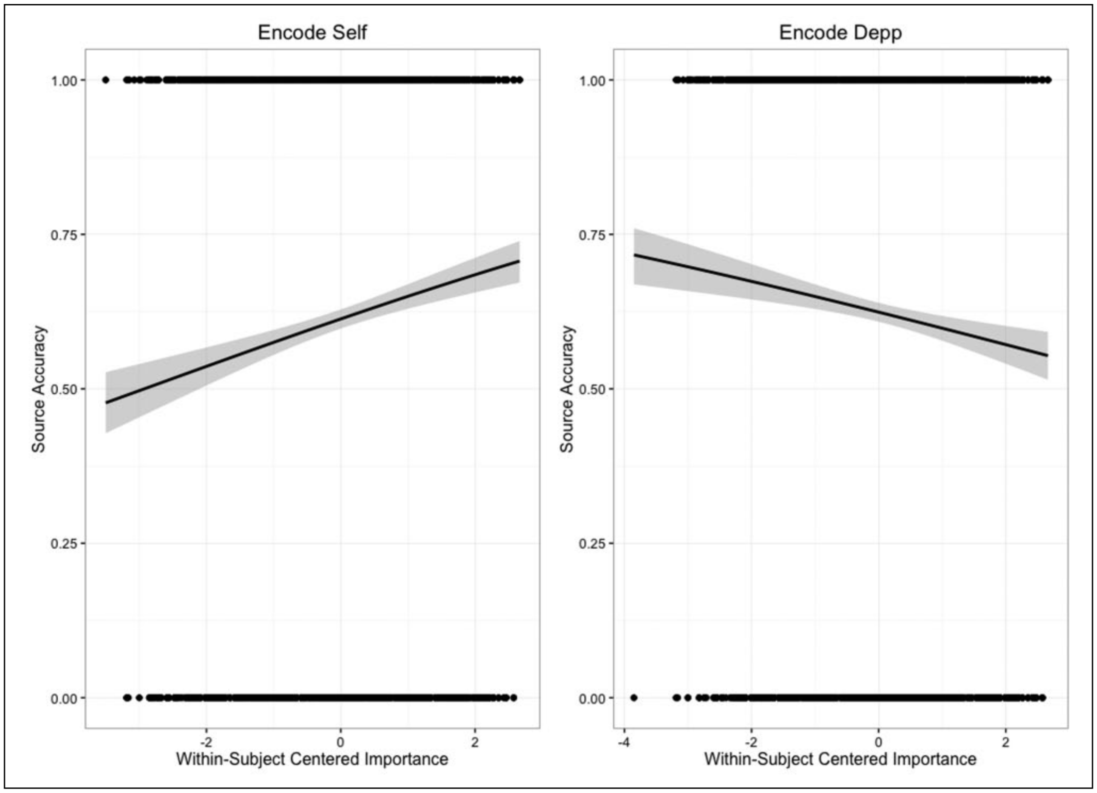

Figure 4. Accuracy by original source and centered within-subject importance for Study 2.
Note. The regression line presented depicts the fixed effect estimates from the logistic multilevel regression for source accuracy as an outcome of subject centered importance. The pattern supported the predicted effect, with accuracy increasing for the self-encoded words at higher levels of importance, and accuracy decreasing for Depp-encoded words at higher levels of importance.

Table 7. Fixed and Random Effect Estimates in Log Odds From Study 2 With Valence Controlled.

Fixed effects variables	Estimate (*SE*)	95% CI
Intercept	1.288 (0.093)***	[1.106, 1.470]
Source	−1.589 (0.104)***	[−1.793, −1.385]
Within-subject importance	−0.057 (0.030)†	[−0.115, 0.001]
Scaled valence ratings	−0.257 (0.023)***	[−0.301, −0.213]
Source × Within-Subject Importance	0.166 (0.042)***	[0.084, 0.247]
Source × Scaled Valence Ratings	0.543 (0.032)***	[0.479, 0.606]
Random effect estimates	Variance (*SD*)	
Subject intercept	0.275 (0.524)	
Observations	7,680	

Note. CI = confidence interval.
†p = .0541. *p < .05. **p < .01. ***p < .001.

between within-subject centered importance and source; despite participants' superior recognition memory for the words presented in relation to the self, importance moderated source-memory accuracy.

Instead, we explain this effect in terms of evidence that self-referential information is processed in specialized ways (e.g., Fenigstein, 1984; Greenwald, 1980; Symons & Johnson, 1997) and that implicit attributions have a pervasive influence on judgment (e.g., Dutton & Aron, 1974; C. M. Kelley & Jacoby, 1990; Schwarz & Clore, 1983), such that, with all other factors held constant, people will infer that subjectively important information is self-referential. Early claims of the specialized processing of self-referential information can be traced to Rogers, Kuiper, and Kirker (1977), who argued that the self is a distinct, well-organized memory concept, promoting better memory for self-referential than other-referential information. From this standpoint, self-referential information recruits specialized processing above and beyond so-called levels-of-processing differences in the sheer amount of semantic knowledge people have of themselves relative to others (cf. Klein & Loftus, 1988). Brain-imaging evidence further supports this view, implicating distinct brain regions responsible for making self–other distinctions relative to semantic distinctions (W. M. Kelley et al., 2002; Moran, Kelley, & Heatherton, 2013). Our findings also appear consistent with the claim that self-referential relatives to other-referential processing entails differences not only in levels of processing but also in schematic processes, wherein stimuli with certain attributes, in this case importance, will trigger self-referential processing.

However, further work is needed to understand the mechanism(s) by which importance biases self-attributions as well as the scope of the observed effects. Future work also may benefit from independently measuring valence of the items used, in case the values have changed in the intervening years since they were introduced by Anderson (1968). Moreover, although consistent with prior work using celebrities as "other" targets, the use of the actor Johnny Depp as the other target might limit the generalizability of the present findings to other targets, especially if they are rated as closer to the self, or vary in how well liked or well known they are to the participants.

One practical implication of our findings is for understanding how people assign responsibility for tasks completed with other people. People tend to overestimate their own contributions to joint activities, presumably reflecting the necessarily greater availability and accessibility of self-referential than other-referential task-relevant recollections (Ross & Sicoly, 1979). Implicating an additional factor that may influence attributions of responsibility for coacted behaviors, our findings suggest that, in a group context, the importance of the task may help determine the magnitude of personal responsibility a person ascribes to herself or himself. Beyond a main effect of overestimating one's joint task contributions (cf. Ross & Sicoly, 1979), coactors may be particularly likely to take credit for contributions to relatively important tasks. We look forward to future research investigating the potentially biasing influence of importance on self-referential attributions in a variety of domains.

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