Self-Schematicity and the Self-Reference Effect

Alicia Marhefka

Houghton College

Abstract

The self-reference effect (SRE) refers to the superior recall that occurs following self-reference, when compared to semantic processing or other types of encoding. The underlying mechanism behind the SRE is still unknown, yet many researchers accept that self-schematicity provides this mechanism (e.g., Maki & McCaul, 1985; Rogers, Kuiper & Kirker, 1977). A self-schema is a cognitive concept that organizes self-knowledge that pertains to a specific trait domain or an activity. (Markus, 1977). I tested the hypothesis that schematicity underlies the SRE in a 2 (Schematicity: Extravert Schematic vs. Aschematic) X 3 (Encoding Task: Self-Reference, Semantic, Intimate Other-Reference, Non-Intimate Other-Reference, Stereotypic Introvert Other-Reference (librarian) and Stereotypic Extravert Other-Reference (salesman)) design. Based on the results of Symons' (1990) study, I predicted that I would find an SRE regardless of schematicity conditions. Although generally my findings supported my hypothesis, contrary to my predictions, only aschematics exhibited an SRE for schema-related words (extraversion).

Self-Schematicity and the Self-Reference Effect

Researchers' interest in the self-concept has driven them to do a vast amount of research in the field of psychology to explore self-based processing (Markus, 1977; Markus & Wurf, 1987). One outcome of this research is that it has greatly enhanced our understanding of recall and memory (Cermak, 1972; Craik & Lockhart 1972). A particularly important part of this past literature involves some researchers' focus on the encoding of information in relation to the self (Rogers, Kuiper & Kirker, 1977; Symons & Johnson, 1997).

In order to form a memory for a particular stimulus we must first perceive it. Perception involves rapid analysis at a number of different levels (Treisman, 1964). At first we are concerned with the sensory information: How does the stimuli feel, sound, look, etc.? At a later stage we begin to compare this new information to abstractions from our past experiences and knowledge (Craik & Lockhart, 1972). At this point we begin to recognize patterns and connections and begin to extract meaning from the stimulus (Tulving & Madigan, 1970). The depth of processing model, proposed by Craik and Lockhart outlines these *levels of processing* that we theoretically experience when interacting with new stimuli.

Craik and Lockhart (1972) evaluated evidence for alternative theories of memory and, finding their weaknesses, proposed their own theory. Their depth of processing (DOP) model rests on the hypothesis that recall is a function of depth of processing and other associated factors, such as time allowed for processing and attention given to the stimulus. Craik and Lockhart argued that during the stages of processing, as the processing of a particular stimulus goes beyond sensory information to processing for meaning, such processing involves progressively increasing depth; that is, it will involve an increasingly greater degree of semantic or cognitive analysis. Thus, according to Craik and Lockhart, the nature of an encoding task

ultimately determines the likelihood of retention of a memory trace. They asserted that, to the extent that a stimulus is processed more deeply, the resulting memory trace will be more durable.

Research by Craik and Tulving (1975) attempted to demonstrate that different depths of processing created by encoding tasks affect memory. In their experiment, participants completed tasks that were designed to promote processing of words at different depths. Three encoding tasks were used: One task was structural ("Does the word start with a capital letter?"), which was designed to focus the participants' attention only on the visual aspects of the word, resulting in processing that is theoretically more shallow than the other tasks. The second task was phonemic ("Does the word rhyme with XXXX?"), and designed so as to focus the participants' attention only on the sound of the word. The final task was semantic ("Does the word mean the same as XXXX?"). Semantic processing was purported to be deepest, compared to the structural and phonemic tasks. Craik and Tulving theorized that semantic encoding promotes elaboration of stimulus words, which involves relating the stimulus words to other words already existing in memory.

After the participants completed the encoding tasks, the experimenters administered a surprise free recall test. According to DOP theory, words that are processed more deeply should be more likely to be recalled. Consistent with the theory, Craik and Tulving (1975) found that semantically-encoded words resulted in higher recall than any of the other encoding tasks.

Rogers, Kuiper and Kirker (1977) extended the DOP paradigm to include a self-reference (SR) encoding task. They theorized that the self-concept is an active and powerful agent that helps an individual to organize his or her world. Rogers et al. thus hypothesized that referring stimulus words to oneself could provide a mnemonic advantage. To test their hypothesis, they performed an experiment similar to Craik and Tulving's (1975), except that they added a self-

reference task ("Does the word describe you?"). They hypothesized that because the self-reference task involves judging stimulus items based on personal descriptiveness, participants would access a well-developed self-concept in order to process them. Consequently, processing by referring words to the self should result in deeper processing, even compared to semantic encoding. Their results supported their hypothesis: Self-reference encoding resulted in recall superior compared to that of structural, phonemic or even semantic encoding.

Rogers et al., (1977) argued that the effects of self-reference, as demonstrated by their experiment, provided evidence that the self is a powerful encoding device. They described the self as a "superordinate schema" (p. 679). They dubbed the difference in memory recall that occurs when self-reference and semantic processing are compared the *self-reference effect* (SRE).

Several studies have replicated the SRE and add to our understanding of the SRE (Bellezza, 1984; Bower & Gilligan, 1979; Kuiper & Rogers, 1979; Symons & Johnson, 1997). Bower and Gilligan (1979) went beyond the standard SR encoding task, "Does this word describe you?" and tested whether connecting a trait word to a memory of a personal past event would produce similar recall to that of a self-reference encoding task. Participants were presented with trait words and, depending on which condition they were in, were asked to either (a) think of a memory in which they had a personal experience that is related to the trait or (b) decide whether the trait was self-descriptive. Bower and Gilligan found that recall levels for the two conditions were the equivalent, obtaining SREs with both tasks when comparing them to other encoding questions. Thus, accessing one's personal memory story to retrieve an autobiographical memory produces results similar to the standard SR task.

Research shows that the size of SRE varies depending on the comparison encoding task. (Symons & Johnson, 1997). Generally, larger SREs are obtained when self-reference is compared to semantic processing versus when self-reference is compared to other-reference (OR; Keenan & Baillet, 1980). OR encoding tasks involve asking participants to decide if a word describes another person, such as President Carter, or one's best friend. Research further showed that the size of the SRE decreases further when the intimacy of the OR target person increases (Keenan & Baillet, 1980; Symons & Johnson, 1997). That is, when relating words to someone we know very well, we remember those words almost as well as words we relate to ourselves, generally speaking. (Keenan & Baillet, 1980; Symons & Johnson, 1997).

Aron, Aron, Tudor and Nelson (1991) proposed that the when participants are asked about an "other" they are close to (i.e., have a more intimate relationship with), processing information with reference to those other people will be similar to that of self-referent processing. Aron et al. tested this hypothesis by asking participants to encode words by relating them to the self, a close other (mother) or a non-close other (stranger). Aron et al. theorized that the close other would be included in the participant's self-concept because of shared characteristics, perspectives and resources. Consequently, processing information by referring it to this close other person should have results similar to that of self-reference. Their results were consistent with their hypothesis.

Explanations for the SRE

Why the SRE occurs still remains a question. Researchers have offered several explanations (Keenan, 1993; Klein & Kihlstrom, 1986; Klein & Loftus, 1988; Rogers et al., 1977; Symons & Johnson, 1997). Two important explanations involve the respective roles of elaboration and organization. Elaboration involves operations performed on a stimulus word in

which the word is transformed independently of other words in the list (Eysenck & Eysenck, 1979). During elaboration multiple connections are formed between the stimulus word and other material already stored in memory (but outside the currently-processed list). These connections with extralist material provide multiple routes in memory by which words can be retrieved, which later facilitate recall (Eysenck & Eysenck, 1979). For instance, the target word "doctor" might produce connections in memory to "white coats," "wealth," or "clinical settings" (Klein & Kihlstrom, 1986).

In contrast, organization involves the association *between* the list words presented to a research participant. In other words, processing involves cognitively assigning the words in the list to common categories (Klein & Kihlstrom, 1986). Organization enhances recall by creating associate pathways in memory between the list words. But it also promotes retrieval by supplying a category label, which provides a ready cue by which the words in the category can be recalled later (Klein & Kihlstrom, 1986).

In the self-reference literature, Klein and Kihlstrom (1986) favored organization as the best explanation of the superior recall associated with the self-reference effect, which by that time was established by many studies (Greenwald, 1981; Hamilton, 1981). They argued that in all previous SRE research, a confound existed between the self-reference questions and organization. For instance, any time the question, "Does this describe you?," is asked there is also an organizational component inherently involved, because the answer to the question involves organizing stimuli into "words that describe me" and "words that do not describe me." This categorizing of the words, Klein and Kihlstrom argued, makes it easier to organize the stimulus words for the SR task, and renders easier to retrieve them later, because the category label "describes me" acts as a retrieval cue.

To test their hypothesis, Klein and Kihlstrom (1986) created an experiment in which encoding task and organization were both manipulated. Their goal was to demonstrate that the SRE would disappear if organization is controlled. They asked 64 undergraduate students to perform either a semantic or a self-referent processing task. Further, the two encoding tasks were designed to either promote organization or not. Twenty-eight words were taken from a normed list, specifically from the category "A Part of the Human Body" (Battig & Montague, 1969). Half of the words were external body parts and half were internal body parts. Each body part word could be used in a saying such as "lend a hand."

Klein and Kihlstrom (1986) created four experimental conditions: a semantic encoding/organized condition, a semantic encoding/unorganized condition, self-reference/organized, and a self-reference/unorganized. Sixteen participants were randomly assigned to each condition. In the semantic/unorganized condition participants were asked questions such as "Does this word fit in the sentence? The young woman had very fair _____") with the target word being *skin.* In the self/unorganized condition, "Does this describe you? I would stick my _____ out for a friend"). For the unorganized conditions, the experimenters made sure that participants did not perceive any particular connection between the stimulus words that would promote organization. The encoding tasks were designed to promote organization: In the semantic/organized condition the question asked was "Is this an external body part?" In the self/organized condition, the encoding task was "Can you think of an incident in which you had an injury or an illness associated with your _____?"). Thus, the organized conditions promoted a focus on the category the stimulus words belonged to (type of body part, or body part associated with an illness), whereas in the unorganized conditions, no apparent connection between the stimulus words was salient.

Following the encoding task, there was a surprise free recall task. The experimenters showed that the SRE is dependent on whether the task allows participants to organize the words are not. Their results suggest that when the self-reference task is organized, but the semantic encoding task is not, the result is a traditional SRE. However, when the semantic task is organized, but the self- reference task is not, the result is a reversal of the SRE. Klein and Kihlstrom (1986) concluded that, organization is responsible for the superior recall of self-reference effect.

Later, Klein and Loftus (1987) argued that the SRE is the result of operations involving both organization and elaboration. They proposed a *dual processing approach,* which was supported by the findings of a meta-analysis of the SRE literature by Symons and Johnson, 1997. Like other researchers (cf. Keenan, 1993), Symons and Johnson concluded that, although the reasons the SRE occurs were still uncertain, it seems largely to stem from the fact that self-based processing is pervasive in everyday life. Thus, people become very good at relating stimuli to themselves.

Although Rogers et al. (1977) explained their results largely in terms of elaboration, the main mechanism examined in DOP theory, they also discussed the role of the self-concept. They theorized that the act of accessing the self-concept that somehow promotes exceptional elaboration. According to Rogers at al., the SRE results because in the process of self-referent encoding, an individual accesses specific parts of his or her self-concept: his or her *self-schemas*. Rogers et al. theorized that the enhanced recall of the self-reference effect was a function of the self's ability to act as a "superordinate schema" that can process self-related, incoming information at a deep level. (p. 679)

In a similar vein of research, Hazel Markus (1977) investigated the nature of the self-concept. She theorized that the self-concept is composed of self-schemas. A self-schema is a cognitive structure that forms as a result of organizing, summarizing and explaining one's own behavior along particular trait domains. A self-schema is formed from past experiences and helps to guide and process new incoming information (Markus, 1977). Theoretically, information about the self is organized and categorized, making it easier to form judgments about new information and possibly to retrieve past information.

A schema may exist for a particular trait or for a behavioral domain, such as athletics, or diet (Kendzierski, 1988). A person who has no schema for a particular trait is called an *aschematic*. For this person, although he or she may behave in ways consistent with the trait at times, the trait is neither descriptive nor particularly relevant to how here she defines him or herself. Theoretically, an individual with a developed self-schema should more easily process new information about the self that is relevant to that self-schema. He or she should more successfully retrieve behavioral evidence, resist information that goes against the current schema and predict future behavior relevant to the self-schema (Markus, 1977). This person is, in a sense, an "expert" in the self-schematic domain. Much research has demonstrated that possessing a self-schema for a particular trait domain leads to these results (Fong & Markus, 1982; Markus, 1977; Markus & Wurf, 1987).

One study that demonstrated the effects of self-schematicity was conducted by Markus, Crane, Bernstein and Siladi (1982), in which they examined the recall of gender attributes by male and female participants. Participants were tested to see if they possessed a feminine or masculine self-schema and then their information processing was examined. Participants with a feminine schema remembered more feminine attributes and required shorter times to process

feminine attributes. They were also more confident of their judgments with regards to feminine words and were able to provide more examples of past feminine behavior. The same was true for participants with masculine schemas and their processing of masculine attributes.

In contrast, individuals who were aschematic for masculinity or femininity (i.e., androgynous) remembered as many feminine traits as masculine traits and showed no difference with regard to response time or confidence in their judgments. Thus, individuals who lacked a self-schema for a particular domain also lacked the processing advantages possessed by self-schematics when information regarding that trait is presented to the self.

With regard to the SRE, according to Rogers at al. (1977) a self-schema "acts as a background or setting against which incoming data are interpreted or coded" (p. 678). When new data are processed they are compared to the knowledge, attitudes and past experiences of the individual. If these new data relate to the self, the self-structure is activated. In their SRE research, one finding that supported the role of self-schematicity was Rogers et al.'s finding that participants, when asked if words were self-descriptive, were more likely to recall the words later if their answer to the question was "yes". Thus, consistent with Roger et al.'s theory, participants were accessing their self-concepts: Theoretically, "yes," or self-descriptive words, by definition, are words that match one's experiences and attitudes, and are stored in the self-concept. The fact that participants better remember these words is evidence that the self-concept facilitates memory processing (Rogers et al., 1977).

The obvious connections between self-schematicity and the self-reference task, as well as the underlying theoretical explanations for them, have led researchers to examine the role of self-schematicity in the self-reference effect. Derry and Kuiper (1981) postulated that the self-schema provides an interpretive framework for judgments about personally-relevant information, which

produces greater elaboration and therefore a more durable memory trace, leading to an SRE for self-schematic words.

Derry and Kuiper's (1981) SRE research specifically examined the role of self-schematicity in individuals with clinical depression. Their participants included 16 clinically depressed individuals and 16 non-depressed individuals who acted as the control group. Each group was asked to make self-referent judgments on words that were either depressed and non-depressed personal adjectives. They presented the words in the context of structural and semantic encoding tasks, and a standard SRE paradigm. Derry and Kuiper also found that clinically depressed individuals displayed significantly enhanced recall only for depressed-content adjectives when the words were processed using self-referent encoding, compared to non-depressed participants. In contrast, non-depressed participants displayed superior recall only for non-depressed adjectives following self-referent encoding, compared to the depressed participants. Derry and Kuiper concluded that their experiment offered strong evidence that self-schematicity underlies the self-reference effect.

One question raised by Derry and Kuiper's (1981) research, which led to my present investigation, involves their failure to provide concrete evidence that the depressed participants in their study actually possessed a depressive schema. In order to select depressed patients, Derry and Kuiper (1981) administered the Beck Depression Inventory (Beck, Ward, Mendelson, Mock & Erbaugh, 1961), and the Hamilton Rating Scale for Depression (Hamilton, 1960), a primary psychiatric diagnosis of unipolar depression and a self-report of dysphoric mood for at least two weeks.

While each of these measures can be used to produce a valid clinical diagnosis of depression, they were not designed to demonstrate that the participants possessed a "depressive

self-schema." According to Markus' (1977) standards to determine self-schematicity, an individual must have a schema for a *particular trait*, and that trait must both be extremely descriptive of them and be extremely important to how they describe themselves. The troubling aspect of Derry and Kuiper's (1981) research is that the construct of depression is rather broad, and consists of several traits and a variety of behaviors. To say that depression is a self-schema based on existing personality and clinical measures seems a stretch. In Markus' conceptualization, self-schemas exist for specific traits and behaviors. Whereas Derry and Kuiper certainly established that their participants were depressed, they did not establish that participants possessed a self-schema for depression in the classic sense. Indeed, self-schema researchers have gone to great pains to distinguish the construct of self-schematicity from trait measures (Markus, 1977). So then, to the extent that there is no such thing as a "depressive self-schema," Derry and Kuiper's conclusions about the role of self-schematicity in the self-reference effect is called into question.

As the previous literature review shows, there is no complete agreement on any underlying mechanism that produces the superior memory trace created by self-reference. Symons and Johnson's meta-analysis (1997) proposed that the SRE results because the self is "a well-developed and often-used construct that promotes elaboration and organization of encoded information" (p.372). Bower and Gilligan (1979) compared memory gains from self-reference encoding and encoding of a well-differentiated other (mother), and found that the can promote memory as well as self-reference (as other researchers have discovered; Keenan & Baillet, 1980). Bower and Gilligan proposed that it was not self-schemacity that was the underlying mechanism in the SRE, but merely the relating of new information to a highly-differentiated

memory structure. They raised a major question: Was there something special about SR, or will accessing any well-developed memory structure result in good recall?

It is Rogers et al.'s initial theoretical explanation of the SRE that is of interest in the present study. Their prediction that SR would lead to higher recall than other encoding tasks was rooted in DOP theory, and based on the notion that SR processing is deeper than semantic encoding. However, the theoretical *reason* that SR is "deeper," according to Rogers et al. is that self-reference by its very nature involves accessing one's self-schemas. They cited the increased memory for self-descriptive words as evidence that self-based processing was occurring. They paved the way for other researchers to argue that self-schematicity was the cause of the SRE (Derry and Kuiper, 1981).

To investigate this notion, Symons (1990) devised an experiment to help determine the role of self-schematicity on the self-reference effect. In her experiment participants were given different encoding tasks, including a self-referent task and a semantic processing task. Participants were also measured and categorized two separate groups, independence schematics (those who possess a self-schema for independence) and aschematics, using standard methods of determining self-schematicity (Markus, 1977). Symons hypothesized, consistent with the then-available literature, that self-schematicity was the mechanism underlying the SRE. She predicted that if this was the case, then participants who were schematic for independent words should exhibit an SRE for independence words, but aschematics (who do not possess a self-schema for independence) should not exhibit a self-reference effect because they lack a schema to facilitate memory for the words (Derry & Kuiper, 1981). Her results showed that, contrary to predictions, participants in the aschematic group showed a self-reference effect just as the self-schematics did. In other words, aschematics, who processed words that were not in their self-schemas,

nonetheless remembered more of those words following self-reference, compared to processing with semantic processing. Her results call into question the importance of self-schematicity in producing the SRE.

In my experiment, I intended to further the understanding of the role of self-schematicity in relation to the self-reference effect. Following the design first used by Symons (1990) and using Markus' (1977) procedures for identifying schematics and aschematics, I measured participants and placed them in schematicity groups based on whether they were schematic or aschematic for introversion and extraversion, two of the Big Five traits (McCrae & Costa, 1987). If self-schematicity underlies the self-reference effect, then those who have schemas for extraversion or introversion should exhibit a self-reference effect when presented with schema-consistent words. On the other hand, aschematics, individuals who lack a schema for these traits, should exhibit no SRE when presented with schema-consistent words.

In my experiment I employed six different encoding tasks: a self-referent task ("Does this word describe you?"), a semantic task ("Does this word have meaning[1]?"), an OR/intimate task ("Does this word describe your mother?"), an OR/non-intimate task ("Does this word describe Oprah?"), a Stereotypic Introvert OR task ("Does this word describe a Librarian?") and a Stereotypic Extravert OR task("Does this word describe a Salesmen?"). I selected the librarian and salesmen tasks for their schema-related qualities (librarians are associated with introverted traits and salesmen are associated with extravert traits) to explore the effect of using these tasks while processing introverted and extraverted words.

I predicted that there would be an SRE overall, with SR resulting in better memory that the other encoding tasks. I also predicted that individuals would remember words that relate to

[1] The use of this particular semantic task was intended to control for organization (cf. Ferguson, Rule & Carlson, 1980; Klein & Kihlstrom, 1986; Symons & Johnson, 1997).

their self-schemas better than words that are not related to their schema. Furthermore, individuals who are aschematic should show no evidence of the self-reference effect because they lack a schema through which to process information and provide a more durable memory trace. Finally, if self-schematicity underlies the SRE, a significant interaction should be obtained, such that when we examine self-schematics versus aschematics, only self-schematics should exhibit SREs on schema-consistent words.

Method

Participants

Twenty male and female undergraduates from Houghton College served as unpaid participants, participating for class requirement. I conducted group sessions, with the number of members of each group varying from one to ten. Sessions lasted approximately 30 minutes. Encoding task was manipulated within subjects, and self-schematicity was a measured subject variable. I treated participants in accordance with the ethical principles of the APA.

Materials

The stimulus words were 60 trait adjectives taken from Cantor and Mischel (1977); 15 related to introversion, 15 related to extraversion and 30 control words were not associated with either schema. All trait words used in the encoding task procedure were balanced for positivity and negativity using Anderson's (1968) norms and randomized. The encoding task was counterbalanced.

Procedure

Participants performed six types of tasks during the encoding phase. The encoding tasks are listed in Table 1. Participants saw each question 12 times in a randomized order. Every participant saw the same 60 trait words. The different encoding tasks served as one of the

independent variable, along with the schematicity of the participant. The dependent variable was free recall.

Procedure

I told the participants they were participating in a "Word Characteristic Study." I gave them no indication that they would need to remember the words or that there would be a free recall at the end. I presented stimulus words via *PowerPoint* projection (one word per slide) at a rate of 7 seconds – similar to Klein and Loftus' (1988) incidental learning paradigm. Participants circled "yes" or "no" in response to each encoding question.

Immediately following presentation of the stimulus words I asked participants to recall as many of the words as they could. They were given 5 minutes to write down as many words that they saw on the PowerPoint slides as they could remember and instructed to write them down in any order, one word per line.

Following the 5-minute period for recall, participants were instructed to complete scales that would determine their self-schematicity for the factors extraversion/introversion (Markus, 1977). There were 12 questions in total relating to six different words associated with the schemas of introversion and extraversion: extravert, introvert, outgoing, shy, lively, and reserved. Participants rated how descriptive each word was of how they feel or act the majority of the time and on how important it was to their self-description. Each rating was made on an 11-point scale. For the descriptiveness rating, "1" represented "Not at all descriptive" and "11" represented "Extremely descriptive." For the importance rating, "1" represented "Not at all important" and "11" represented "Extremely important." Following these scales the participants were asked a few demographic questions which concluded the experiment. They were then debriefed on the experiment's purpose, thanked for their time and dismissed.

Determining schematicity. To determine whether participants would be assigned to the schematic or aschematic condition, I used the same criteria used as Markus (1977). In order to be classified as schematic for extraversion, participants had to rate at least two out of three of the extravert traits as being highly descriptive (8-11 on the 11-point scale); rate at least two out of three of the extravert traits as being highly important to their self-concept (8-11); and had to rate at least two out of three of the introvert traits as being highly non-descriptive (range of 1-4 on the 11-point scale). In order to be classified as schematic for introversion, participants had to rate at least two out of three of the introvert traits as being highly descriptive (8-11 on the 11-point scale); rate at least two out of three of the introvert traits as being highly important to their self-concept (8-11); and had to rate at least two out of three of the extrovert traits as being highly non-descriptive (range of 1-4 on the 11-point scale). In order to be considered aschematic, the participant had to rate at least two out of three extraverted traits as being neither highly descriptive nor highly non-descriptive (range of 5-7) and rated those traits as being low on importance to their self-concept (range of 1-6); and had to rate at least two of the three introverted traits as being neither highly descriptive nor highly non-descriptive (5-7) and who rated those traits as being low on importance to their self-concept (1-6).

I used Markus' (1977) criteria to rate the 20 participants for schematicity, which yielded 3 extraversion self-schematics and 3 aschematics. Fourteen participants could not be classified. I included them in my data analysis.

Results

If self-schematicity underlies the SRE, then only participants who possess self-schemas should exhibit an SRE in the self-schematic domain. To test this hypothesis, I ran a series of 3 sets of analyses. Unfortunately, I was not able to obtain a sufficient number of participants to

make a full test of my hypothesis that tests the hypothesis for both introversion and extraversion schematics. Consequently, all my analyses involve only extraversion schematics and extraversion aschematics, along with all other participants who were not classifiable, who form a third comparison group.

All three sets of analyses involved a mixed ANOVA, with each performed on a different word type (extraversion words, introversion words, and words unrelated to either introversion or extraversion). Each 2 X 3 ANOVA had one between subjects variable (Schematicity: Extravert Schematic vs. Aschematic) and one within subjects variable (Encoding Task: Self-Referent, Semantic, Other-Referent/Non-Intimate (Oprah), Other-Referent/Intimate (Mother), Stereotypic Introvert (Librarian) and Stereotypic Extravert (Salesman)). The dependent measure, in each analysis, was the number of words recalled in the particular category.

To test the hypothesis that extravert schematics would recall more extravert words than aschematics, I ran the first mixed ANOVA. Results showed a main effect of Encoding Task on recall, $F(5, 85) = 5.34$, $p = .003$. The graph of the recall means can be viewed in Figure 1. Generally, the SR recall mean ($M = 1.16$) exceeded the mean recall following Semantic Encoding ($M = .91$), Intimate OR (Mother) ($M = .36$), Stereotypic Introvert ($M = .98$) and Stereotypic Extravert ($M = .29$). However, somewhat oddly, memory following Non-Intimate OR ("Does this word describe Oprah?") led to the highest recall ($M = 1.5$). The main effect of Schematicity did not reach significance ($F(2, 17) = 2.93$. $p = .081$).

There was also a significant interaction of Schematicity X Recall, $F(5, 85) = 2.17$, $p = .027$. The pattern of means can be viewed in Figure 2. These results are based on a very small sample size ($N = 3$ for both schematics and aschematics), however results show that the extravert

schematics did not exhibit greater memory for extraverted words, compared to the other groups. In fact, ironically, only aschematics exhibited SREs on extraverted words.

To test the hypothesis that schematicity would have an effect on introverted words, I ran the second 2 X 3 mixed ANOVA. For this analysis, results showed a strong main effect of Encoding Task on recall, $F(5, 85) = 6.19$, $p < .001$. Results can be seen in Figure 3. As can be seen in the graph, recall means for introverted words following the encoding tasks reflect those typically seen in the SRE literature. Although there was not apparent difference between SR and Intimate OR (Mother), this is a common finding (Symons & Johnson, 1997). The means are reported on the graph.

There was no main effect of Schematicity, $F(1, 17) = .54$, $p = .592$. This is consistent with the self-schematicity literature, in that none of the participants were schematic for introverted words. There was a significant interaction of Schematicity X Encoding Task, $F(5, 85) = 2.19$, $p = .026$. The means can be seen in Figure 4. The general pattern of the means suggests that there is no SRE that is dependent on Schematicity. However, the SRE in these results is most likely driven by the fact (for both this interaction and the main effect of encoding task) that some encoding tasks resulted in a zero-level of recall. Finally, on unrelated words (words designed to be control words, unrelated to either introversion or extraversion) results revealed no significant main effects or interactions.

Discussion

If self-schematicity underlies the SRE then only participants who possess a schema for introversion or extraversion should exhibit a SRE in that domain. The results of this experiment, though based on a very small number of participants, are consistent with the idea that self-schematicity is not responsible for the SRE..

As would be expected given Markus' (1977) findings, participants who possess a self-schema for a particular trait should be able to use that self-schema to assist in processing information about that trait when related to the self. For introverted words there was no main effect of self-schematicity. This follows what Markus' study would predict because no participants had a schema for the introversion. Unrelated, control words also showed no effect of self-schematicity as would be expected because they would not activate a schema. However, extravert schematics did not exhibit SREs for extraverted words. Rather, only aschematics exhibit SREs on the extravert words. These results for self-schematic extravert words go directly against the hypothesis that possessing a self-schema for a trait should result in an SRE.

With regard to the main effect of Encoding Task, the finding that higher recall following the non-intimate OR encoding task("Does this word describe Oprah?) was not expected. (Keenan & Baillet, 1980; Symons & Johnson, 1997). If anything, recall following this encoding task should have been lower than recall following both the SR task and the intimate OR task. This odd finding may simply be due to having such a small sample size, that could have inaccurately represented the real recall ability associated with a non-intimate other encoding task (or, for that matter have affected some of the other findings). However, it may also be related to the fact that several of the trait words randomly paired with the Oprah encoding tasks were traits that generally described Oprah or a talk show host (vivacious, generous, spirited). This explanation is somewhat diminished by the fact that use of the stereotypic extrovert OR task ("Does this word describe a salesman?") did not produce better recall than other tasks. However, it is also the case that Oprah Winfrey is a very well-known and well liked person with whom participants could have felt a connection. Another oddity is that schematics did not exhibit an SRE on extraverted words. (Only the aschematics did.) I predicted that there would be no difference in SRE across

the conditions: Both schematics and aschematics should have shown an SRE for self-schema-related words. Although I expected an SRE with the schematic group, (likely lacking due to only having three participants) the general pattern nonetheless suggests there is not an SRE dependent on Schematicity, precisely because aschematics exhibited the SRE for words presumably not part of their self-schemas. Thus, my results are consistent with Symons' (1990) study. Although further research should be done, both my study and hers suggest that possessing a self-schema is not necessary for an SRE. The implications of these results are that if the self-schema is not responsible for the self-reference effect, some other factor must be.

So what is behind the self-reference effect? Symons and Johnson's (1997) meta-analysis reported that the self-reference effect is smaller when compared with other-reference and when the encoding tasks simultaneously promote elaboration and organization. These results led Symons and Johnson to take on a previously established viewpoint (Klein & Loftus, 1988) that the self-reference effect occurs because "the self is a well-developed and often-used construct in memory that promotes both elaboration and organization of encoded information" (p. 372). Thus, in order to produce a self-reference effect one does not need a schema for a particular trait but rather a conscious awareness of the self against which one can measure incoming data. Another important finding from Symons and Johnson's (1997) meta-analysis is that self-reference encoding is more powerful in comparison to other-reference and semantic encoding when the presentation of stimulus is briefer. They suggested that self-reference may result in a swifter ability to process information and enhance recall. They offered the interpretation that this may be because the self is activated spontaneously. Thus, because the self is used so frequently and automatically when taking in new information, it is a well-practiced encoding device.

In order to improve upon this study, obtaining a greater number of participants would help to clarify the trends. Additionally, reducing the number of encoding tasks or increasing the number of stimulus words will help results to be seen more clearly. Furthermore, Markus' (1977) measures of determining schematicity resulted in a large proportion of the participants who were unable to be sorted into aschematics and schematics. It is unlikely that 14 out of the 20 individuals lacked a schema for a Big-Five personality trait. What is more likely is that the criteria laid out by Markus failed to adequately to measure schematicity. In Markus' study, she obtained data for self-schematicity through the scales, latency of self-description, evidence of descriptive self-reports of past behavior and predicting the likelihood of schema-related future behavior. However, when determining schematics, only the scales were used. The other measures were tasks used to determine how self-schemata affect the processing of new information. In an effort to more adequately measure schematicity, I recommend a more valid measurement be considered. Perhaps because Markus' study showed that individuals with a self-schema for a particular trait can easily retrieve behavioral evidence and predict future behavior, these measures can be used to better predict schematicity.

Overall, the large body of research regarding the self-reference effect provides interesting interpretations about the cause of the effect, but no unanimous answer. Further research regarding the self-reference effect and self-schematicity will help enhance our understanding of the role of the self and schemata in processing information.

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Table 1

Encoding Tasks

Self-Referent Task			
Does the word describe you?	YES	NO	(Circle one.)
Non-Intimate Other Task			
Does the word describe Oprah?	YES	NO	(Circle one.)
Intimate Other Task			
Does the word describe your mother?	YES	NO	(Circle one.)
Stereotypical/Other-Reference			
Does the word describe a librarian?	YES	NO	(Circle one.)
Stereotypical/Other-Reference			
Does the word describe a salesman?	YES	NO	(Circle one.)
Semantic Task			
Is the word meaningful?	YES	NO	(Circle one.)

Figure 1. Main Effect of Encoding Task on Recall for Extravert Words

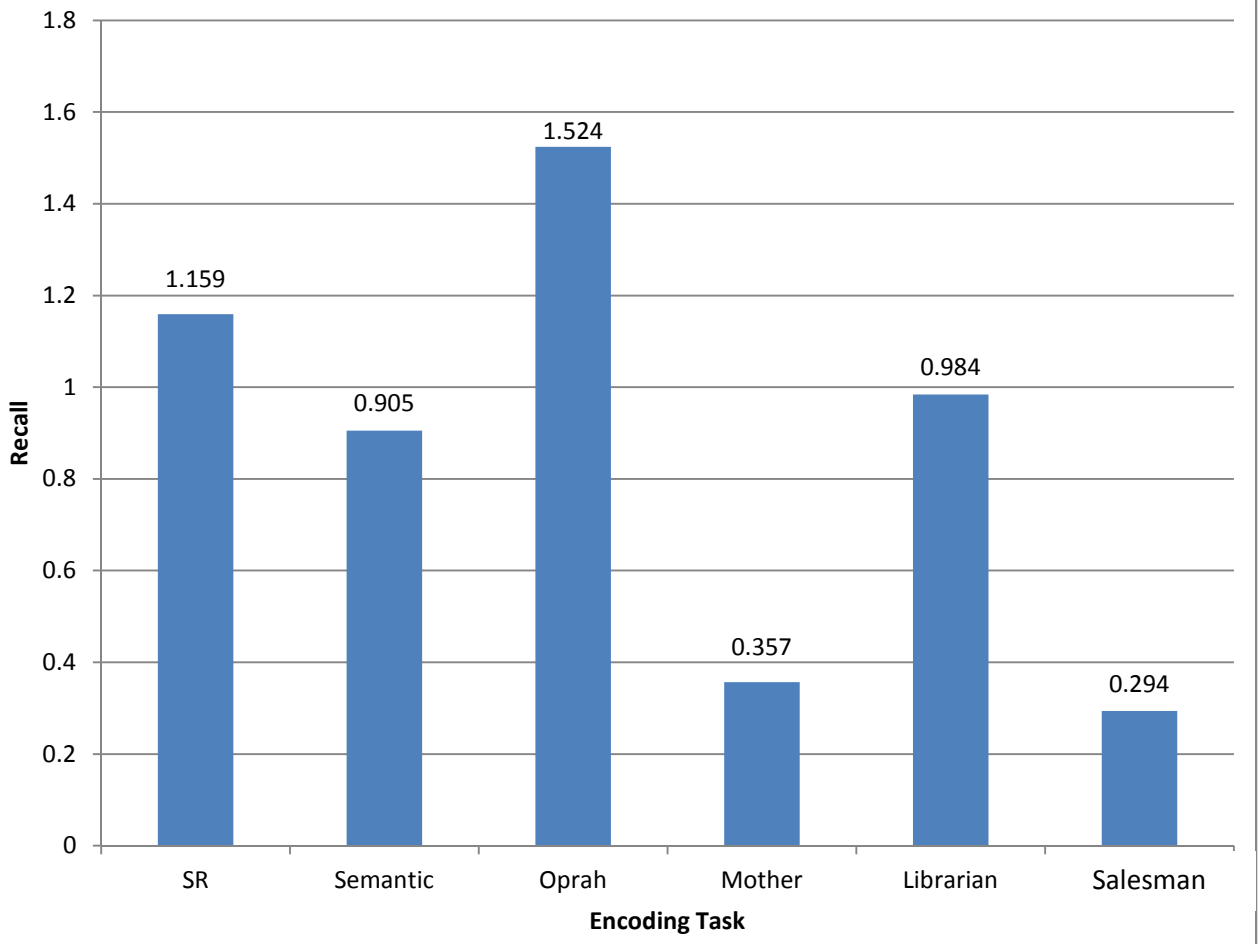

Figure 1. Mean stimulus words recalled for each encoding task are represented above their respective bar.

Figure 2. Interaction of Schematicity and Encoding Task on Recall for Extraverted Words

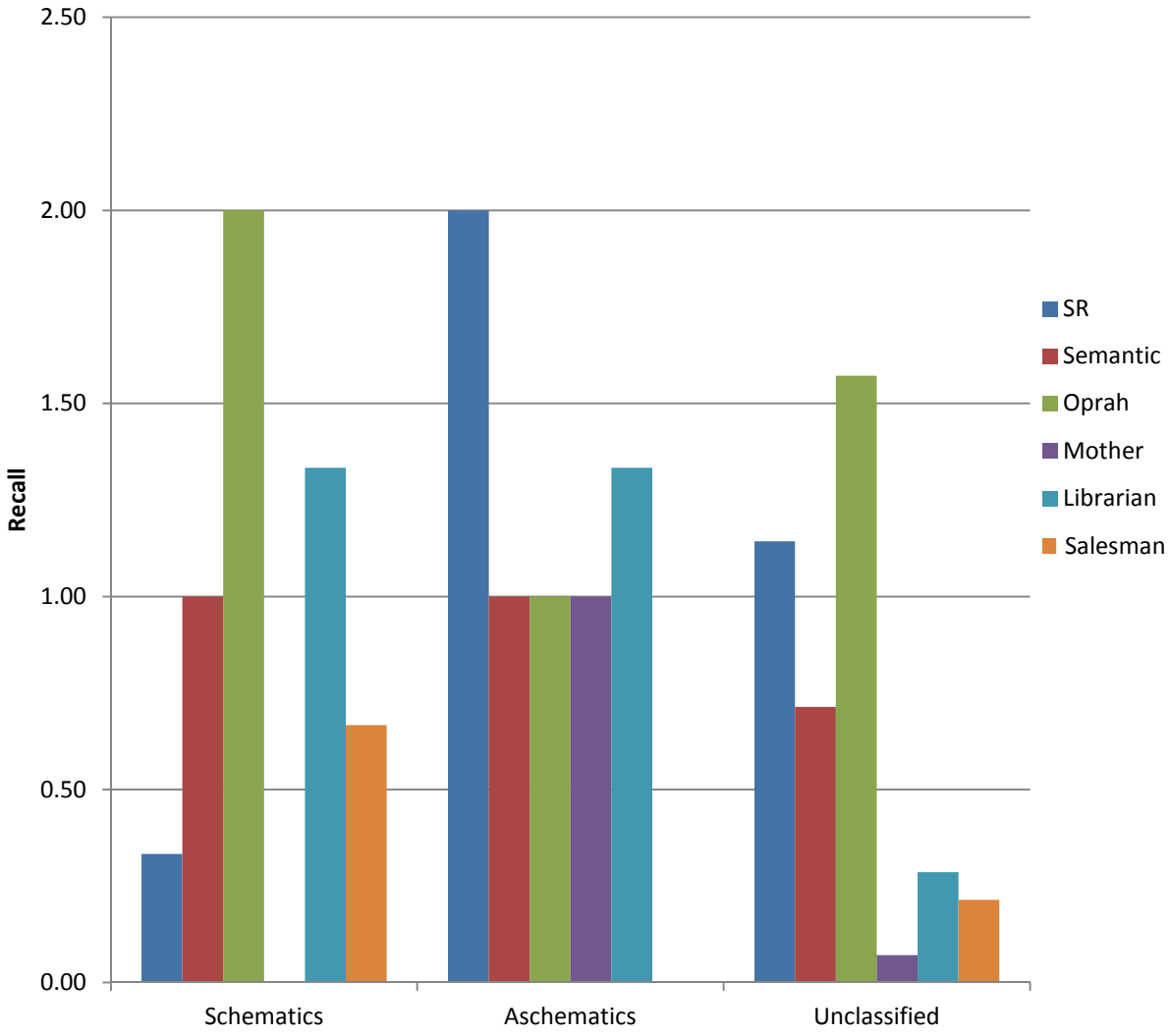

Figure 3. Main Effect of Encoding Task on Recall for Introverted Words

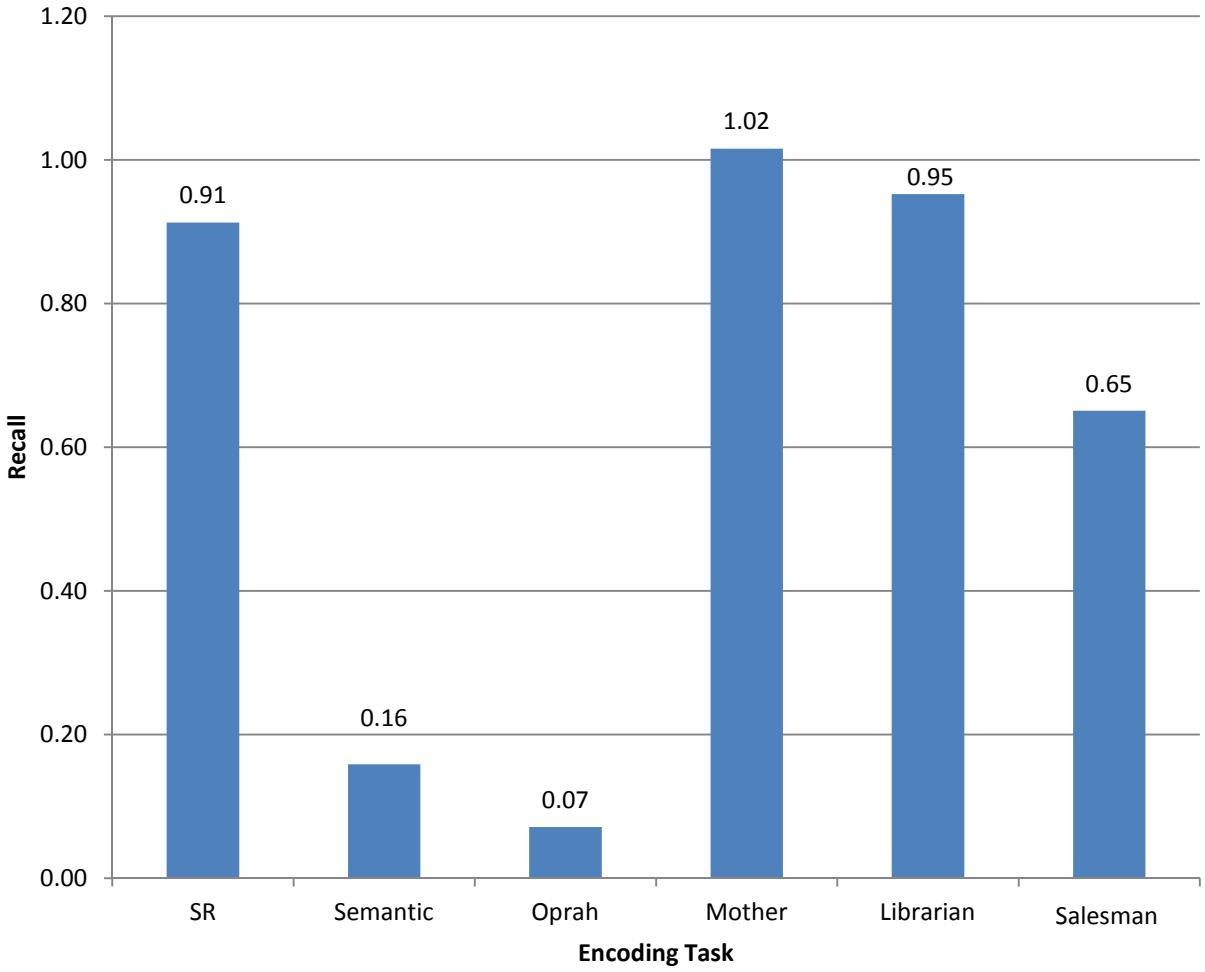

Figure 3. Mean stimulus words recalled foe each encoding task are represented above their respective bar.

Figure 4. Interaction of Schematicity and Encoding Task on Recall for Introverted Words