# Mental Representation Differences between Teenagers and Adults Regarding Self-Concept and Self-Schema Appearance

Review Article

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## Abstract

Mental representations of Self-concept and self-esteem were obtained from a sample of 171 high school students by using a natural semantic network. From students´ concept nets were possible to obtain word pairs related to self-schemata to be tested against associative and non-related word pairs in a semantic priming experiment. The goal was to look for meaningful differences regarding self-schemata concept organization in the human lexicon between this sample of teenagers and 88 young adults coming from two different cultural backgrounds. Results from semantic priming studies showed that self-schemata word concept latencies are different from other semantic related word recognition latencies in the study. Interestingly, in the three samples, self-esteem concepts related to physical attributes were recognized (primed) as different from conceptual ones (interference). No main effect to recognition of self-schema concepts was obtained through age. Implications for a dual mental representation for self-esteem are discussed.

**Keywords:** Self-Esteem; Self-Concept; Mental Representation; Meaning; Semantic Priming; Semantic Nets.

## Introduction

Mental representations in our memory empower us to signify our inner and external world [21]. Of all, the development of mental representations regarding the self seems to be central to signify who we are and how we valuate ourselves as social beings [11]. Even when the existence of such mental knowledge structures was doubted (for a review see [12]), there is now a large body of empirical evidence supporting self-schemata existence [7, 19], describing its properties [14, 22] and its development and behavior [27] in our memory functioning [26].

Thus, self-schemata mental representations provide generalizations about oneself based on previous experiences and it contains information about the social self, self-knowledge, and about two intimate linked components: self-concept and self-esteem [11]. These last two self-schemata components have a complex structure. For instance, self-concept has been related to an internal multidimensional structure defined by at least 18 mental dimensions regarding competences such as academic performance, music, art, as well as some other 15 dimensions regarding physical

appearance [23]. However, whereas self-concept relates to knowledge about oneself (informational side), global self-esteem is your general attitude (emotional side) toward yourself that implies self-worth judgment [6, 14]. Then, the self as an organization knowledge structure must include conceptual organized information in long term memory about how a person perceives him/her self and how these perceptions relate to feelings [18].

Seminal research on memory and self-schema emphasize how organized knowledge about the self affects memory processes (e.g. cued recall, [13]) and how it relates to emotion [26]. Modern cognitive models of self-schemata (e.g. connectionist models of the self; [14]) specify how theoretical computational models account for empirical data emerging from this research. These kind of cognitive models still highly idiosyncratic, and even those models dealing with mental representations based on people´s internalizations [18], do not really specify self-schema internal structure, concept organization and how all of these conceptual emotional valenced information leaves its mark on how we signify ourselves and our world.

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Here it is argued that by obtaining natural semantic networks from subjects, then natural mental representations from self-concept and self-esteem can provide insights on how these self-schema components are mentally organized. In addition, it is proposed that by using a standard memory technique (semantic priming) it is possible to test if these knowledge structures constitute a psychological reality in the human lexicon.

## Method

Two cognitive mental representation studies on self-concept and self-esteem were carried on. The first one was intended to explore self-schemata concept organization in teenagers and the second one was implemented to identify if age differences impose semantic concept organization in the study participants´ lexicon.

## Participants

Regarding the mental representation study, a sample of one hundred high school students (aging from 15 and 17 years old; 65 females, 35 males) were required to generate mental representations of self-concept and self-esteem by using a semantic net technic. Here, a follow up study required 71 more students with the same characteristics. The, in order to explore concept organization of both selves in long term memory at different ages a semantic priming study considered self-schemata word recognition times from the above teenager participants and from two samples of young adults coming from two different cultural backgrounds. The first sample consisted of 45 bachelor students (aged from 20 to 25 years old, from a main populated city at the north of Mexico: Monterrey; 38 females and 7 males), and the second sample consisted of 43 bachelor students (aged from 21 to 25 years old, from a small country city at the north of Mexico: Monclova; 33 females and 10 males).

## Instruments

Conceptual semantic definitions to nine core self-schemata related target concepts were obtained by using a natural semantic technique. This technique has been tested [10] and shown to produce definitions for the represented objects based on their meaning and not on free associations or pure semantic category membership. Specifically, participants were instructed to provide definitions for self-concept and self-esteem inquiries like How do I perceive myself: a) socializing, b) intellectually, c) Sentimental, d) Family belongingness, e) Physically, f) As a friend g) as a student, h) as a son, i) as a person. These inquiries were based on several self-concept research studies comparing different Latin-American populations [28]. Teenager students were asked to define the nine target concepts one by one, using other single word concepts as definers (which could be any noun or adjective, but not a complete phrase, pronouns, articles, prepositions or conjunctions). After definition each definer had to be rated according to its relevance as a definer on a scale ranging between 1 (lowest relevance) and 10 (highest relevance). Thus the ten highest ranked definer for each of the nine targets are obtained.

From this data, it is possible to construct a semantic net if desired. For example, a given target concept would have links to each of its definers, having a value of association between the definer and the target concept. Moreover, frequently some concepts serve as definers for more than one concept. These concepts are called common definers and groups of definers are interconnected through them. High numbers of common definers tend to appear whenever there is a close relation among target concepts.

Connectivity among definers can be obtained by using a weight connectivity value (Wij) that mirrors the way definers co-occur through conceptual definition groups such that:

$$W_{ij} = -\ln [p(X=0 \,\&\, Y=1)\, p(X=1 \,\&\, Y=0)]\, [p(X=1 \,\&\, Y=1)\, p(X=0 \,\&\, Y=0)]^{1} \quad -----(1)$$

where X represents one of the concepts of the pair of concepts to be associated, and Y another concept. For instance, in determining association values among concepts in a natural semantic network like the one appointed before, the joint probability value $P(X=1 \,\&\, Y=0)$ can be obtained by computing how many times the definer X of a pair of concepts appeared in a list of definers in which Y did not appear, and the same for the other probability values [20].

As will be shown in the next section this weight connectivity will not only allow to use graphic tools (Gephi analysis) to graphically visualize self-schemata semantic concept organization but to use metrics regarding concept organization [1, 25]. In turn, semantic graphs and semantic content form conceptual definitions to target inquiries permitted us to obtain self-schemata related word pairs to be used in a semantic priming study.

## Procedure

Written consent for participation in the study was obtained from all participants. In the mental representation study participants were sited in front a computer where a brief debrief was presented followed by instruction and trail sessions. Target inquiries were randomly presented to each student. This study took around 20 minutes to complete. Regarding the memory research study (semantic priming), participants were sited in front of a computer. Here, the idea was to compare self-schemata word pairs´ recognition times against other semantic related word pair (associatively related) and non-related word pair latencies to test for concept organization in the human lexicon. Thus a 2 (cultural background: Main city, country city) x 2 (Age groups: Teenagers and Young adults) x 4 (semantic relation: associative, self-esteem, self-concept, none related) Time parameters for this study were a Stimulus Onset Asynchrony(SOA) of 250 milliseconds and an Inter Stimulus Interval (ISI) setting of 50 milliseconds. Stimuli were randomly presented. This study took around 8 minutes for completion.

## Results

The obtained conceptual definitions groups to nine target inquiries are shown in Figure 1. GEPHI visual representation based on a connectivity weigh matrix as suggested by equation (1) is also shown in Figure 1. Cluster metrics suggested four groups. Table 1 shows inclusion of relevant concept definers in each cluster.

Notice from figure 1 that even when physical attributes appear as concept definers of "How do I perceive myself physically" these attributes appeared as a concept group unconnected to the rest

**Figure 1. Definition Groups for Nine Self-Concept Related Target Concepts (Top Panel) Used to Visually Represent A Semantic Network Analysis (Bottom Left Panel). Network Metrics Show that Concept Definers can be Encapsulated in Four Main Clusters (Bottom Right Panel).**

| SOCIALIZING | | INTELLECTUAL | | SENTIMENTAL | | AS A FAMILY MEMBER | | PHYSICALLY | |
|---|---|---|---|---|---|---|---|---|---|
| DEFINER | RANKING | DEFINER | RANKING | DEFINER | RANKING | DEFINER | RANKING | DEFINER | RANKING |
| Friendly | 46 | Intelligent | 47 | Loving | 42 | Happy | 36 | Tall | 55 |
| Kind | 25 | Good student | 18 | Happy | 30 | Responsible | 30 | Thin | 40 |
| Talker | 24 | Responsible | 18 | Tender | 27 | Plenty | 21 | Brown | 33 |
| Happy | 24 | Capable | 18 | Plenty | 26 | Tender | 20 | Short | 30 |
| Funny | 23 | Good | 17 | Sad | 26 | Honest | 16 | Handsome | 28 |
| Shy | 22 | Lazy | 17 | Lazy | 17 | Grumpy | 14 | Brown eyes | 23 |
| Honest | 21 | Ready | 15 | Weeping | 17 | Respectful | 12 | Fat | 20 |
| Plenty | 21 | Thinker | 11 | Grumpy | 16 | Good | 11 | Good | 15 |
| Respectful | 18 | Applied | 9 | Romantic | 13 | Funny | 11 | Strong | 14 |
| Serious | 14 | Fast | 8 | Honest | 11 | Loving | 10 | Ugly | 14 |

| AS A FRIEND | | AS A STUDENT | | AS A SON | | AS A PERSON | |
|---|---|---|---|---|---|---|---|
| DEFINER | RANKING | DEFINER | RANKING | DEFINER | RANKING | DEFINER | RANKING |
| Honest | 39 | Responsible | 70 | Responsible | 50 | Honest | 50 |
| Good | 37 | Intelligent | 47 | Good | 49 | Responsible | 49 |
| Tender | 32 | Worker | 33 | Respectful | 34 | Happy | 34 |
| Kind | 29 | Lazy | 29 | Tender | 32 | Friendly | 32 |
| Happy | 28 | Good Student | 27 | Obedient | 27 | Grumpy | 27 |
| Comprehensive | 25 | Punctual | 26 | Honest | 27 | Intelligent | 27 |
| Trusty | 24 | Honest | 26 | Kind | 21 | Kind | 21 |
| Sincere | 23 | Good | 24 | Comprehensive | 17 | Respectful | 17 |
| Loyal | 23 | Attentive | 23 | Loving | 16 | Good | 16 |
| Funny | 20 | Respectful | 19 | Grumpy | 15 | Comprehensive | 15 |
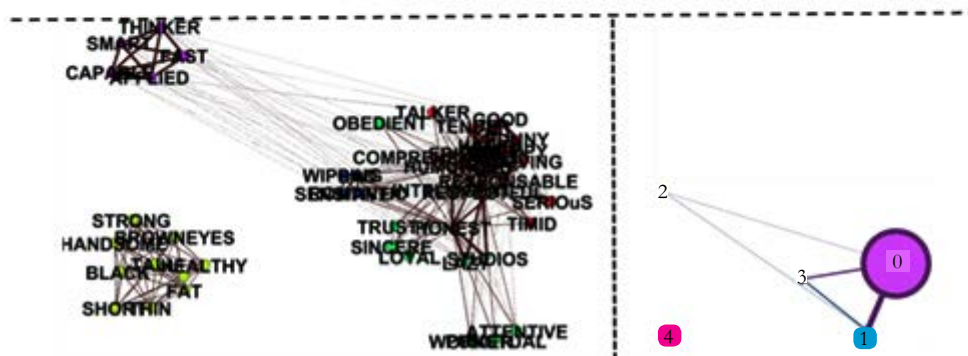


**Table 1. Inclusion of Concept Definers Through Different Clusters.**

| CLUSTER 0 | CLUSTER 1 | CLUSTER 2 | CLUSTER 3 | CLUSTER 4 |
|---|---|---|---|---|
| Friendly | Honest | Capable | Sad | |
| Intelligent | Trusty | Smart | Sensitive | Thin |
| Happy | Sincere | Thinker | Wipping | Balck |
| Responsible | Loyal | Applied | Romantic | Short |
| Kind | Good Student | Fast | | Handsome |
| Good | Worker | | | Browneyes |
| Humuruos | Lazy | | | Tall |
| Tender | Panctual | | | Healthy |
| Respectfull | Attentive | | | Stron |
| Talker | Obedient | | | |
| Funny | | | | |
| Comprehensive | | | | |
| Grumpy | | | | |
| Timid | | | | |
| Serious | | | | |
| Loving | | | | |

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of the concept definers. These definers were clustered as a single unconnected group and this was an unexpected since physical appearance (body image) seem to be a relevant aspect of self-concept [29] self-esteem development processes and self-worth judgment [8, 24]. Perhaps, the fact that target inquiries were related more to self-concept rather than self-esteem might be a reason to obtain this dual concept organization. Thus another study was carried on with 71 participants from the same environment and rank age. However, instead of inquiring about self-perception the questions changed to self-worth evaluations like "How do I feel about: a) socializing, b) being intellectually, c) being sentimental, etc.". Interestingly the same concept organization was obtained.

In order to explore if this is related to a development process in teenagers the first sample of 100 students and two young adult samples from two different cultural backgrounds were required to take a semantic priming study (with a lexical decision task) to compare recognition times of self-word pairs to semantic and non-related words. The idea was to know if this fractured representation of concepts regarding the self imposes different concept organization in the human lexicon at different ages. Table 2 shows describe the word pairs used in this semantic priming study.

Regarding self-esteem stimuli in Table 2, non-asterisk word pairs relates to emotional content whereas asterisk word pairs have self-concept and self-worth words priming physical appearance. Figure 2 shows an interaction graph describing recognition performance (in milliseconds) of primed target concepts. Here, an ANOVA over correct recognition of targets (recognition error were less than three percent) showed a main effect for the semantic relation factor $F_{(4, 640)} = 13.778$, p= 0.00000, $\eta2 = 0.079$ (Left panel from Figure 2). Interestingly, a post hoc comparison between physical attributes recognition latencies and other word pair latencies showed that concepts related to physical appearance are recognized faster $F_{(1, 640)}= 21.260$, p = 0.00000, especially if they are compared to other self-schemata concepts $F_{(1, 640)}= 26.963$, p = 0.00000. No main effect was obtained for the gender factor, however, a main effect was obtained for the age factor $F_{(2, 160)}= 8.4524$, p = 0.00032, $\eta2 = 0.095$. That is young adults and teenager performed differently through experimental conditions $F_{(1, 640)}= 4.07$, p= 0.00000 (Right panel from Figure 2). Post

hoc comparisons showed that no main effect due to cultural differences can be observed, that is, both adult samples had a similar performance in the semantic priming study. As it will be discussed later a relevant result was that teenagers had significantly faster recognition to physical attributes than young adults $F_{(1, 640)} = 3120.628$, p = 0.00000.

Overall, abstract self-schemata concepts are recognized as different to the rest of word pairs $F_{(1, 640)} = 41.602$, p = 0.00000. Moreover, there is no doubt that physical attributes concepts seem to be differently organized in the lexicon in terms of self-schemata. This is supported not only by the fact that these concepts obtained the fastest recognition latencies but also by the fact that in the mental representation study definers of physical appearance were no connected to any other self-concept and self-esteem abstract concept definer.

## Discussion

Shavelson, Hubert and Stanton [23] identified that at least 15 self-concept dimensions relate physical appearance. Moreover, it is well documented that physical appearance strongly relates to self-esteem, measures of body image and mood [17]. For instance, high investment on physical appearance relate to poor self-esteem and vice versa [3]. Certainly, body image perception plays a central role to many areas of psychological functioning [4] and has strong implications on well being and quality of life [3]. Then, how can it be explained from the obtained current results that in terms of semantic mental representation physical appearance attributes seem to be represented independently from self-concept and self-esteem. That is, in terms of meaning it looks like physical appearance follows an independent mental representation from other relevant self-schema meaning formations.

On their part Jung and Lennon [17] (see also [2]) define schematic individuals as those persons that are highly interested in their appearance (i.e., appearance is important, self-relevant, and a main topic) and are actively concerned with a stereotyped schematic body image. People like this, tend to be associated to mood disorders (anxiety and depression [16]), eating [4] and prone to low self-esteem. Jung and Lennon also argued that schematic individ-

**Table 2. Stimuli Used in the Semantic Priming Study Regarding the Self.**

| ASSOCIATIVE | SELF-ESTEEM | SELF-CONCEPT | NONE RELATED |
|---|---|---|---|
| BEE-BITE | TALKER-TALL * | RESPONSIBLE-HONEST | FLOOR-SCREEN |
| AIRPLANE-PILOT | FUNNY-THIN * | INTELIGENT-GOOD | MOUNTAIN-BLOOD |
| DENTIST-TOOTH | SHY-BROWN * | RESPECTFUL-KIND | WAR-ELEVATOR |
| DAY-NIGHT | SERIOUS-SHORT * | AFFECTIONATE-LAZY | SPOON-HOUR |
| GLOBE-HAND | CAPABLE-HANDSOME * | FRIENDLY-LOYAL | SHORT-SODA |
| WINTER-COLD | SMART- FAT* | COMPREHENSIVE-GRUMPY | ATTIC-BEACH |
| ONION-TEARS | THINKER-STRONG* | SHARING-HAPPY | PEPPER-EARTH |
| MOUSE-CHEESE | SMART-UGLY * | WORKER-TRUSTY | WEDING-CHOCOLATE |
| WEB-SPIDER | HAPPY-EASY | DISTRACTED-ACHIEVER | ZUGAR-FROG |
| TENNIS-BALL | SAD-CALLADO | STUDIOUS-ATTENTIVE | SHIRT-JAM |
| BLUE-SKY | SENSIBLE-SKILLED | OBEDIENT-CREATIVE | PISTOL-CHAIR |
| VACA-LECHE | WEEPER-ROMANTIC | SOLIDARY-PLAYFUL | METRO-FLOWER |
| SMOKE-TOBACCO | ROMANTIC-JELOUS | EXTROVERTID-SINCERE | OCEAN-OPERA |
| CIRCUS-CLOWN | MELANCOLIC-HANDSOME | SENTIMENTAL-PUNCTUAL | PORT-NOTEBOOK |
| SHEEP-WOOL | LOVING-CRAZY | TOLERANT-BAD | DOLL-OXIGEN |

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**Figure 2. Physical Differences are Recognized as Different from Other Self-Schema Concept in the Study (Left Panel), and Adults and Teenagers Seem to Perceive Differently These Physical Attributes (Right Panel).**
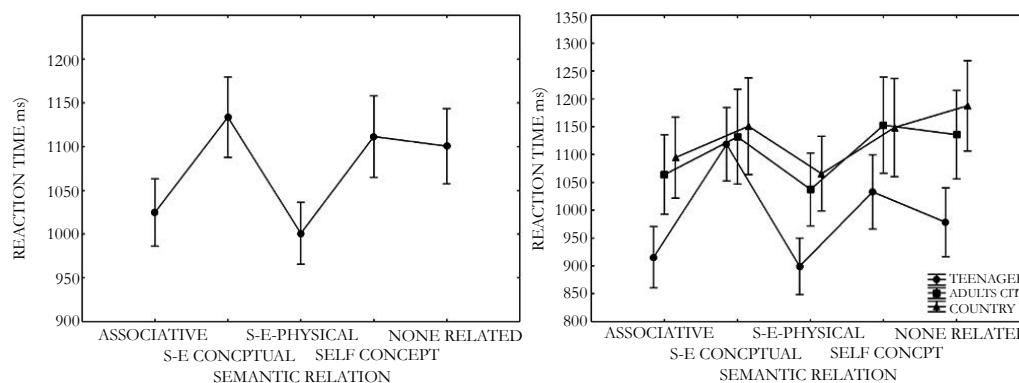


uals by focusing too much their cognitive live on self-appearance schemata they become vulnerable to the appointed disorders.

As it can be seen from the mental representation study, participants showed a rather positive self-schema of themselves (honest, loyal, intelligent, etc.). Thus, by maintaining unconnected a physical representation of body image from a self-concept and a self-esteem schema they assure to maintain a stable positive meaningful perception of themselves, does not matter if they have a negative or positive valuation of being tall or short, or about if they are fat or thin.

However, regarding teenagers in the semantic priming studies physical attributes were "hyper-primed" and it seems that this priming effect changed due to age (slower recognition times). This agrees with the relevance of physical appearance information during adolescence [17] specially on self-esteem [8]. Changes of how physical attributes become less relevant to the self [27] might be related to slower recognition in the priming study. This is not possible to conclude from the current study. Even though, here it is argued that self-appearance schema is not a requisite for meaning formation of self-concept or self-esteem in healthy individuals.

More research is on demand and follow up studies using this cognitive research approach to explore self-schemata might well consider different population samples with different general or particular indexes of self-esteem or self-concept.

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