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VARIETIES OF RELIGIOUS COGNITION: A COMPUTATIONAL APPROACH TO SELF-UNDERSTANDING IN THREE MONOTHEIST CONTEXTS

by Kevin S. Reimer, Alvin C. Dueck, Garth Neufeld, Sherry Steenwyk, and Tracy Sidesinger

Abstract. This study considered representations of divine and human others in the self-understanding of monotheists from three religions. Self-understanding was conceptualized on the basis of semantic and episodic knowledge in narrative response data. Given the importance of social context in the formation of cognitive schemas, the project emphasized self-understanding in a comparative religious design. The sample included sixty nominated religious exemplars who responded to a structured interview. Schemas were subsequently mapped for Jews, Muslims, and Christians by comparison of self and other representations in a computational model known as *latent semantic analysis* (LSA). Findings indicated that representation of the divine is far removed from parents in cognitive schemas for all participants. Unlike Jews and Christians, Muslims appear to represent human others on the basis of self-understanding which principally references the divine. When considered in a computational semantic space, exemplars generally represent the self in a manner corresponding with divine and peer figures.

Keywords: cognition; monotheist; representation; schema; self-understanding; semantic space

Kevin S. Reimer is Professor of Psychology in the Department of Graduate Psychology, Azusa Pacific University, 901 East Alosta Avenue, P.O. Box 7000, Azusa, CA 91702; e-mail kreimer@apu.edu. Alvin C. Dueck is Frank and Evelyn Freed Professor of Psychology at Fuller Graduate School of Psychology, Pasadena, California. Garth Neufeld is clinical intern at Alliant International University, Fresno, California. Sherry Steenwyk and Tracy Sidesinger are doctoral students at Fuller Graduate School of Psychology, Pasadena, California.

It was William James in *The Varieties of Religious Experience* ([1902] 2002) who famously identified the Western tendency to describe the divine using self-referencing categories. The landscape of religious cognition likely reflects self-understanding known in part through social adaptations related to various others. Symbolic and embodied representations of self, human others, and the divine are organized into aggregate *cognitive schemas* reflecting adaptations within a goal framework (Bretherton 2005; Collins and Allard 2001; Collins and Feeney 2004). Distances between representations may offer clues regarding hierarchies of self-understanding associated with religious socialization contexts. The main objective for the present study is to explore underlying differences in cognitive schemas toward an empirical account of self-understanding in monotheist experience. The research reported here considers self-understanding by mapping self and other representations in a computational semantic space. In particular, we examine associations between representations for nominated exemplars from three monotheist religions: Judaism, Islam, and Christianity.

How are variations in self and other representations compared between monotheist religions? The social-intelligence view of personality understands selves as representations reflecting semantic and episodic knowledge (Kihlstrom, Beer, and Klein 2003; Kihlstrom and Cantor 2000; Kihlstrom et al. 1988; Kihlstrom, Marchese-Foster, and Klein 1997). *Semantic* knowledge comprises abstract concepts regarding the self including values, attitudes, traits, and motives. *Episodic* knowledge includes concrete information such as events situated in autobiographical experience. In the purview of social intelligence, both elements of self-understanding are related to aspects of memory (that is, semantic and episodic) that support representations (Squire 1992; Tulving 1983; 2002). Self-understanding may be considered as a hierarchy of representational concepts that reflect individual and social concerns in contexts of gendered, cultural, or religious interest (Kihlstrom, Beer, and Klein 2003; Kihlstrom and Cantor 2000; Kihlstrom, Marchese-Foster, and Klein 1997). If representations of self and other could be studied on the basis of semantic and episodic knowledge, cognitive schemas might be studied in a manner reflecting socialization differences by religious context.

Recently, Kevin S. Reimer and David Wade-Stein (2004) devised an empirical method to map schemas using representations of self and other related to identity in adolescent moral development. To account for semantic and episodic dimensions of self-understanding, representations were cued through questions in a structured interview. Narrative responses for various self-representations (actual self, ideal self, despised self, temporal self) along with others (caregivers, romantic self-understanding figures) were compared to one another with the use of *latent semantic analysis* (LSA) (*lsa.colorado.edu*; Kintsch 2007; Landauer 2007; Landauer and Dumais 1997; Landauer, Foltz, and Laham 1998). Familiar to researchers in cogni-

tive science and psycholinguistics, LSA is a computational model that provides meaning comparisons between words, sentences, or paragraphs in a high-dimensional semantic space (Kintsch et al. 2007; Landauer 2007). The model is premised on a matrix decomposition technique similar to factor analysis known as *singular-value decomposition* (SVD). In LSA, words, sentences, and paragraphs are assigned a vector as an estimate of meaning in semantic space. Cosine angles between vectors quantify similarity or dissimilarity between texts. In the adolescent identity study, LSA data were subjected to inferential statistical techniques to establish distances between representations.

Results from this study demonstrated that it is possible to map self and other representations by computational analysis of group narratives. Cognitive schemas mapped in semantic space suggested that adolescent moral identity is characterized by self-consistency and a socially embedded moral awareness. Schemas demonstrated a temporally stable sense of self through time, with short distances between parental and self representations suggesting kin-oriented moral socialization (Reimer and Wade-Stein 2004). The semantic-space approach might be modified as a proxy for self-understanding in monotheist religious experience. Presumably, distances between representations reflect interpersonal histories culminating in the current organization of self-understanding in cognition. Patterns reflecting socialization processes are evident in the degree to which semantic and episodic knowledge is shared between representations in narrative. Greater distances between self and other representations are observed in the absence of shared semantic and episodic knowledge, with the inverse true of diminished distances. Thus, representational distances in schemas reflect self-understanding positioned in social context (Kihlstrom et al. 2003).

One advantage of the LSA method is that it preserves symbolic and embodied aspects of self-understanding. The question of whether knowledge is principally symbolic or embodied continues to generate lively debate in the cognitive sciences (Barsalou 1999; Glenberg 1997; Kintsch 1998; Lakoff and Johnson 1999; Landauer and Dumais 1997). Because LSA is not physically embodied, concerns have been raised over the model's capacity for handling physically grounded meaning typical of human experience (Glenberg and Robertson 2000). Recent studies have demonstrated that LSA is able to make embodied (in addition to symbolic) meaning inferences via *symbolic interdependency*, or symbolic interpretation of conceptual relationships as outlined in the semiotic scheme of Charles Peirce (Deacon 1997; Louwerse 2007). The model proved able to simulate prototype classifications and rank time in a temporally appropriate manner (Louwerse et al. 2008). This is worth noting with regard to the quantification of religious self-understanding into representational maps. Self-understanding narrative is burdened with symbolic knowledge grounded in an embodied understanding of real-world contingencies.

The ability to specify cognitive schemas through the language of particular socialization contexts raises a potentially thorny problem. A comparative religious design favors participants who evince maturity and prosocial commitment as viable representatives of their respective tradition. However, different monotheist religions likely entertain disparate ideas of what is meant by "maturity" or what constitutes demonstrable commitment. Lawrence J. Walker and Karl Hennig (2004) offer a solution to this conundrum through emphasis on naturalistic perspectives when study variables are abstract or values-laden. In other words, people's ordinary conceptions of an abstract construct such as morality or religiousness can be used to establish benchmarks for psychological functioning. In order to create a level playing field for the comparative study of schemas between monotheist religions, naturalistic perspectives of religious maturity and prosocial commitment might be used to identify exemplars for study. Consideration of underlying differences for schemas is therefore deliberately descriptive and exploratory, premised upon criteria of maturity and prosocial commitment defined through consensus of the particular religions under study.

In summary, the main goal for the present research is to consider underlying differences in cognitive schemas toward a comparative account of monotheist self-understanding. The study evaluates differences in self-understanding patterns as represented in schemas for nominated exemplars from three monotheist religions. Patterns inherent to religious self-understanding are likely to vary by religion where human and divine others are understood in context and mapped in a computational semantic space. The general study hypothesis was that nominated monotheist exemplars would demonstrate schemas closely integrating self and other. Assuming an important role for kin influence in religious socialization, we hypothesized that distances would be short between parental and self representations for monotheist exemplars. We additionally hypothesized that the divine representation would be close to self and parent representations in a manner reflecting exemplary religious maturity.

METHOD

Nominated Exemplar Participants.   Following Walker and Hennig (2004), three focus groups were convened from Jewish, Muslim, and Christian religions, respectively. Focus groups consisted of six to twelve leaders and clergy from each religion in a diverse California metropolitan region. Leaders were invited from religious groups that were numerically well represented in the area, including Reform Jewish, Sunni Muslim, and Presbyterian Christian religions. Focus groups were conducted in English, and individuals were asked to identify exemplar nomination criteria that reflected religious maturity. Focus-group process included prioritization of criteria,

with similar descriptors collapsed into general statements. Groups were asked to confirm criteria as being representative of process and religious perspective. The resulting list of nomination criteria included (a) learning and being in continual process, (b) sense of (and acting on) responsibility for one's fellows, (c) sense of one's own faith that informs daily life, (d) God-consciousness, (e) believes in Torah/Qur'an/Bible as word of God and follows it in daily life, (f) lives life intentionally, (g) practices faith (prayer, fasting, observances, charity, declaration of faith, pilgrimage), (h) promotes peace among all peoples, (i) is actively engaged with God and others, (j) lives a joyful, balanced, and humble life, and (k) is interested in helping others grow religiously in a quietly contagious manner.

Consensus nomination criteria were provided to leaders and clergy who participated in the focus groups. Leaders and clergy were asked to nominate individuals from within their respective religion who demonstrated strong evidence of nomination criteria. Nominated exemplars included several official religious leaders but mainly everyday individuals from area synagogues, mosques, and parishes. Nominated exemplars were contacted and invited to participate in the study. Interested exemplars were mailed consent forms and scheduled for a face-to-face interview. Participants were provided with a $50 honorarium.

Of thirty-six exemplars nominated from Reform Jewish leaders and clergy, twenty participated. This sample group averaged 45.0 years of age (*SD* = 11.2, *range* = 25–66). The sample self-identified as ethnically Jewish (82.4 percent), European (11.8 percent), or Latino/a (5.9 percent). Level of education included high school completion (5.0 percent), bachelor's degree (30.0 percent), master's degree (55.0 percent) and doctoral degree (10.0 percent). Of twenty-seven nominations from Sunni Muslim leaders and clergy, twenty participated. The Muslim sample averaged 34.5 years of age (*SD* = 11.4, *range* = 23–79). They self-identified as ethnically European (70.6 percent) or Turkish (29.4 percent). Level of education included high school completion (5.0 percent), bachelor's degree (35.0 percent), master's degree (35.0 percent) and doctoral degree (25.0 percent). Of thirty-two nominations from Presbyterian Christian leaders and clergy, twenty participated. The Christian sample averaged 56.9 years of age (*SD* = 11.3, *range* = 33–72). They self-identified as ethnically European (80.0 percent), Latino/a (15.0 percent), or American Indian (5.0 percent). Level of education included high school completion (15.0 percent), trade school or associate's degree (5.0 percent), bachelor's degree (10.0 percent), master's degree (50.0 percent) and doctoral degree (20.0 percent). The lower mean age for Muslim exemplars reflects the recently emigrated, highly educated profile of Turkish nationals in local Sunni mosques. Overall, nominated exemplars were well-educated individuals engaged in professional vocations. All exemplars were fluent in the English language.

Procedure.   Participants responded to structured interview questions. Questions included references to *global self* (What kind of person are you?) along with various others incorporated into schemas from past and present. These others included *romantic partner* (What kind of person are you with your romantic partner?), *parents* (What kind of person are you with your parents?), *best friend* (What kind of person are you with your best friend?), and *divine* (What kind of person are you with God?). Interview responses were recorded and transcribed. All identifying content was removed from transcripts. Interview recordings were erased with a numerical code assigned to ensure confidentiality. Transcribed responses were collated by interview question for each of the three religions. In this manner, aggregate responses to the interview were constructed for Jewish, Muslim, and Christian sample groups. Each aggregate response served as one of five representations (self, romantic partner, parents, best friend, divine).

The study objective was to map cognitive schemas with the use of a computational model widely known to researchers in cognitive science and psycholinguistics (Landauer 2007; Kintsch et al. 2007). LSA judgments are based on the model's global knowledge of the world. A number of semantic spaces are available for the purpose of providing LSA with knowledge related to topics consonant with researcher interests. Examples include undergraduate psychology textbooks, scientific article abstracts, works of literature, and technical manuals. For the present study, a semantic space was selected based on meaning typified by narrative from participants living in urban California. Known as TASA (Touchstone Applied Science Associates, the company that provided the corpus), the 11 million–word semantic space contained sections of spoken English, including common knowledge roughly equivalent to first-year university undergraduates in the United States.

Based on the knowledge cache provided through the TASA space, LSA assigns vectors to words, sentences, and paragraphs in a network of meaning approximations. Vectors are positioned in semantic space based on the presence of related words. For example, the term *bicycle* most frequently co-occurs with *pedals* and *handlebars* in TASA. These neighbor terms provide meaning orientation for the bicycle vector. LSA judges the meaning of a given word based on its encounters with the target and passages where the word may be expected but is not found (Landauer 2007). To create meaning comparisons, LSA vectors are compared on cosine angles, resulting in similarity judgments expressed as a covariance matrix (-1 to +1). The model is capable of making fine distinctions in meaning, including metaphor comprehension and the ability to grade undergraduate psychology essay exams with strong reliability compared to human evaluators (Kintsch 2000; Landauer 2007).

The present study used LSA to map cognitive schemas based on the similarity of five narrative representations (self, romantic partner, parents,

best friend, divine) for three groups of Jewish, Muslim, and Christian ex-
emplars. The five representations were assembled as aggregate text blocks
by religious sample group. Schema maps therefore emphasized differences
between religions rather than between individuals. Text blocks for repre-
sentations were positioned as variable columns in a data matrix for LSA.
Distance between representations was calculated where LSA measured the
level of semantic similarity between each text block with thirty items from
a widely validated survey of relationship quality known as the *relationship
scales questionnaire* (RSQ) (Griffin and Bartholomew 1994). Thus, five
representations were positioned as columns with RSQ items as rows, re-
sulting in a 5 x 30 LSA matrix for each monotheist religion. LSA covariance
data were then subjected to secondary statistical analyses for interpretation.

RESULTS

Results are partitioned into two sections for the interpretation of LSA co-
variance data. The first section reviews multidimensional scaling (MDS)
of covariance data. MDS was used to construct perceptual maps of repre-
sentations. The second section reviews hierarchical cluster analysis (HCA).
HCA was applied to covariance data in order to determine set relations for
representations. The results highlight underlying dimensions and cluster
relations indicative of self-understanding with human and divine others in
a social intelligence perspective.

Multidimensional Scaling (MDS).   For each religion, MDS was used
to construct perceptual maps of representations approximating schemas.
MDS outlines structure in distances between variables when the basis for
comparison is unknown or undefined. Structure is identified along or-
thogonal axes (dimensions) reflecting frequency of co-occurrence among
variables. The ALSCAL MDS model was used for the present study as an
approach suitable for data matrices of group samples (Hair et al. 2005).
Generally, modeled data reflect good fit where Kruskal's stress value is equal
to or below .20, with R^2 at or above .60 (Hair et al. 2005). For the three
MDS models in the present study, Kruskal's stress was .03 (Jewish), .02
(Muslim), and .02 (Christian). Final R^2 values were .99 for all three mod-
els, respectively. These values indicated strong overall model fit. Thus, MDS
models were constructed for two-dimensional perceptual maps presenting
distance measures between representations on the basis of similarity or
dissimilarity as judged by LSA.

The MDS model solution for Jewish exemplar representations is given
in Figure 1. Inspection of representation distribution suggested a *self-other*
dimension and a *transcendent* dimension. Identification of these dimen-
sions was subjectively based on interpretation of how representations were
arrayed. The positive pole of the horizontal *self-other* dimension was an-
chored by the *self* representation, with the *parent* representation at the

opposing pole. The positive pole of the vertical *transcendent* dimension was anchored by the *romantic partner* and *self* representations, with the *divine* representation at the opposing pole.

The MDS model for Muslim exemplar representations is presented in Figure 2. The horizontal dimension was anchored at the positive pole by the *self* representation, with the *parent* representation at the negative pole. The distribution mirrored the horizontal dimension in the Jewish MDS model. This suggested a similar *self-other* interpretation for the Muslim
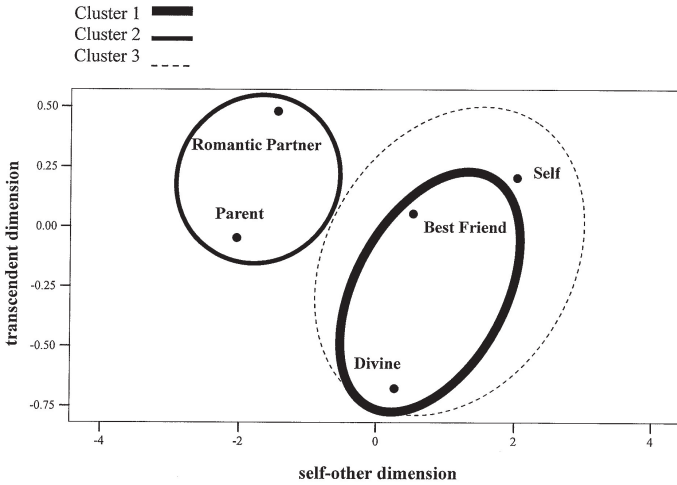

Fig. 1. Multidimensional scaling dimensions and hierarchical cluster analysis clusters for Jewish exemplar schemas.
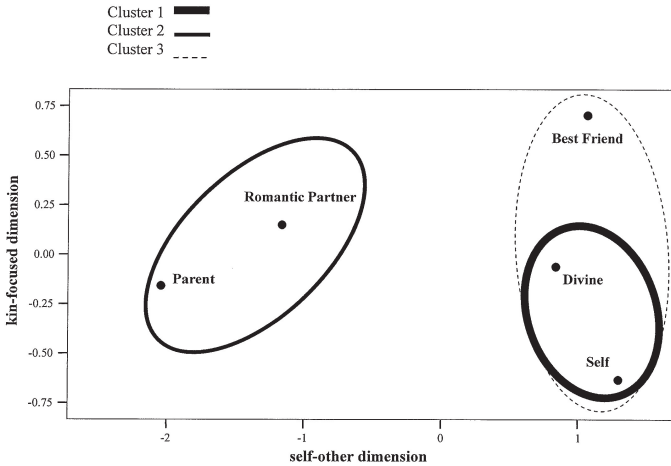

Fig. 2. Multidimensional scaling dimensions and hierarchical cluster analysis clusters for Muslim exemplar schemas.

horizontal dimension. However, the vertical dimension also suggested a *self-other* interpretation, anchored by the *best friend* representation at the positive pole and the *self* representation at the opposing pole. The central location of the *divine* representation did not clarify any differentiating role for transcendence in either dimension. For the sake of interpretive consistency, we chose to label the Muslim MDS horizontal dimension as *self-other*. The vertical dimension suggested a *kin-focused* self-understanding profile, with the *parent* representation closest to the *self* representation and the *best friend* representation farthest away.

The MDS model solution for Christian exemplar representations is given in Figure 3. The horizontal dimension was anchored at the positive pole by the *divine* and *self* representations, with the *parent* representation at the negative pole. As with the other models, this suggested a *self-other* interpretation. The vertical dimension was anchored at the positive pole by the *divine* representation, with the *self* representation at the negative pole. This mirrored the *transcendent* interpretation for the vertical dimension in the Jewish MDS model. Thus, we labeled the vertical dimension for the Christian model solution *transcendent*.

Hierarchical Cluster Analysis (HCA). In addition to MDS analyses, LSA covariance matrices were subjected to HCA, the purpose of which was to explore set relations between representations in a manner suggestive of self-understanding and socialization processes. This is an important additional step given that LSA covariance data are derived from a high-dimensional semantic space. MDS effectively compresses these dimensions into a two-dimensional plane suitable for visual inspection with the result
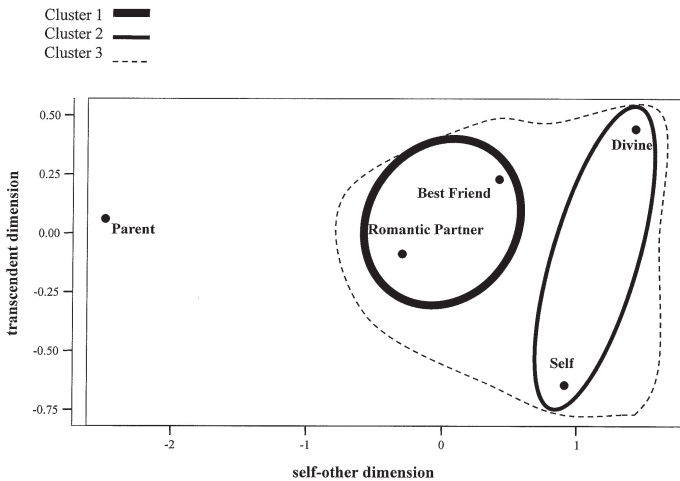

Fig. 3. Multidimensional scaling dimensions and hierarchical cluster analysis clusters for Christian exemplar schemas.

that perceived distances may become distorted. HCA provides a check on the problem by outlining set relations between representations. HCA for each religion was conducted using Ward's method with the squared Euclidean distance interval. At present there is no established basis for identifying an optimal number of clusters for any solution, making this process somewhat open to interpretation. However, the HCA agglomeration schedule contains information that may be used to delimit clusters (Hair et al. 2005). The point where large percentage change between agglomeration coefficients becomes more stable (as reflected in smaller percentage change) is suggestive of how many clusters are indicated for the overall solution. This rule was applied to the three HCA analyses run for Jewish, Muslim, and Christian LSA matrices, respectively.

To simplify interpretation, HCA cluster solutions are integrated into MDS perceptual maps for each religion in Figures 1, 2, and 3. This integrated presentation reflects a complementary function between HCA and MDS on LSA covariance data, where cognitive representation clusters are afforded orientation for assessment of proximities in semantic space. Using the percentage change in agglomeration rule, a three-cluster solution was indicated for all religions. Cluster boundaries are illustrated in MDS perceptual maps with different lines enclosing clustered representations. In Figures 1–3, thick (solid) boundary lines reflect the first cluster, followed by a thin (solid) boundary line for the second cluster and a dotted line to enclose the third cluster. Figure 1 presents clusters for the Jewish exemplars. Cluster 1 enclosed the *divine* representation with *best friend*. Cluster 2 enclosed the *parent* representation with *romantic partner*. Cluster 3 enclosed Cluster 1 with the addition of the *self* representation. Figure 2 presents clusters for the Muslim exemplars. Cluster 1 enclosed the *divine* representation with *self*. Cluster 2 enclosed the *parent* representation with *romantic partner*. Cluster 3 enclosed Cluster 1, with the addition of the *best friend* representation. Figure 3 presents clusters for Christian exemplars. Cluster 1 enclosed the *romantic partner* representation with *best friend*. Cluster 2 enclosed the *divine* representation with *self*. Cluster 3 enclosed Clusters 1 and 2.

DISCUSSION

The main purpose of the study was to explore distances between divine and human representations in a manner suggestive of self-understanding in schemas. Using a comparative religious sample design, we obtained nominated exemplar narrative responses to questions of self, romantic partner, parents, best friend, and divine. These narrative responses were analyzed using LSA to consider similarity and dissimilarity of representations in a computational semantic space. The general study hypothesis was confirmed, namely, that nominated exemplars would uphold schemas closely inte-

grating self and other. We additionally had hypothesized that parental influence is implied by close proximity between parental and self representation. This hypothesis was not confirmed. Our third hypothesis, that the divine representation would be close to self and parent representations, was confirmed.

To better account for these findings, we consider results from each religion as unique contexts reflecting underlying differences in schemas, followed by summary discussion of commonalities between groups.

Differences and Commonalities in Social Schemas.   The Jewish exemplar schema map demonstrated strongest proximal similarity between best friend and divine. The inclusion of self on the third cluster suggests that representations of divine and human figures are significantly analogous. Self-understanding may include peer affinities in terms of how Jewish exemplars conceptualize the divine (that is, as a close friend), but additionally through shared religious experiences in close peer relationships. The second cluster between parent and romantic partner representations offers support to recent arguments for intergenerational transmission of relational attachment style between parental and romantic figures (Obegi, Morrison, and Shaver 2004). The lack of inclusion of divine or self representations in the second cluster is somewhat surprising, indicating a discrete parcel of knowledge. The comparative linguistic basis for the LSA method suggests that similar language is used by Jewish exemplars to describe both divine and human others and that the divine is conceptualized as an important influence in self-understanding.

The Muslim exemplar schema map reflects a strong link between divine and self representations in the first cluster. The primacy of this association is augmented with inclusion of the best friend representation on the third cluster. The finding raises an issue regarding what aspects of self-understanding are fundamentally resourced as reference points in schemas. Unlike Jewish and Christian schemas, the Muslim schema map seems to suggest that human relationships are first referenced on the divine. If this is true, the basic composition of self-understanding in Muslim religious cognition may differ considerably from Jewish and Christian religions. Indeed, the difference observed in the vertical MDS dimension suggests that adult Muslim exemplars retrospectively view their relational experiences with human others in divine terms. As with the Jewish exemplar group, the second cluster combined parental and romantic representations in a manner that did not suggest immediate or direct influence in religious self-understanding.

The schema map for Christian exemplars reveals close semantic similarity between romantic partner and best friend representations in the first cluster. This difference suggests a variation on how romantic and peer self-understandings are represented. The second cluster inclusion of divine and

self representation is in the third cluster combined with the first. The Christian schema map implies association between significant self-understanding figures excluding parents. Self-understanding in this instance appears to reflect those who are readily accessible in the contemporary social network. Correspondence between divine and human self-understanding figures appears to be evenly distributed, integrating these relationships into self-understanding with relative parity. The present finding should be interpreted cautiously, however, given that the mean age of the Christian sample was considerably higher than exemplars from other religions. It is possible that the influence of parents was framed in different domains of memory reflecting the fact that for many of these exemplars both parents had already died.

It seems clear that the adult exemplars interviewed in this study did not represent parents in a closely analogous position relative to the divine or self, meaning that whatever self-understanding influences may have existed at earlier developmental stages are diminished through contemporary socialization alternatives, notably best friends. We did not consider the religious practices or affiliation of best friends for the study, yet the significance of contemporary peer relationships is worthy of future investigation in terms of individual differences in religious self-understanding. Our use of the RSQ in these exploratory analyses may have "front-loaded" the efficacy of peer-oriented language in LSA, making the use of other self-understanding items stems (that is, romantic) relevant to future investigation of schemas. A counterargument also can be made to the effect that many adult participants have adjusted relationships with parents in alignment with peer-to-peer friendships.

Implications and Conclusion.   How are cognitive schemas implicated in the manner by which monotheists perceive the divine in self-understanding? The propensity for people to use relational language to describe religious experience suggests a complex interchange between underlying representations of self and other in self-understanding. Our intent was to model these representations as self-understanding influences, a strategy predicated on the belief that representations are imbued with semantic and episodic knowledge. This perspective makes the language of self-understanding particularly important toward an understanding of how self is understood in relation to divine and human others. The study was designed on the assumption that schemas associated with religious self-understanding are hardly monolithic structures, instead reflecting varied influences related to the context of particular religions and social networks.

Nominated exemplars from all three religions did not evince close integration of parent representations with either self or the divine. This surprise finding is worthy of additional reflection. We note that for at least one monotheist religion, Islam, schema map and cluster findings suggest

that religious self-understanding is framed with the divine as the preeminent referent for human others. One possible explanation for this finding is that powerful developmental influences on self-understanding (such as parents) so centrally implicate the divine in everyday life that divine representations eventually supersede human others in schemas. Certainly elements of perceived immanence were evident in the responses of Muslim exemplars that commonly prefaced their reflections with the refrain "If Allah wills." It may be that Muslim exemplars over time grow to fundamentally realign self-understanding toward the divine. Gradual reorganization of schemas influences the manner by which individuals perceive the social network past and present. The subtlety of the longitudinal question supports further study on the developmental contours of religious self-understanding.

It appears that the divine is closely represented with self in exemplar schemas for all three religions. While not unexpected for persons nominated by each tradition for their exemplary religious maturity, the close proximity between divine and self representations may spotlight the extent that transcendent beings are understood in a manner analogous to human relationships. In our estimation, the divine is not human and cannot be physically perceived in time and space. As a consequence, knowledge of the divine must at some level remain prototypical (Fehr 1988; Walker and Hennig 2004; Walker and Pitts 1998). Exemplars from monotheist religious traditions may model some aspects of prototypical divinity on human others, but it is likely that this prototype is far more complex—featuring aspects of self-understanding that incorporate religious values learned from teachings, holy writings, observances, and pilgrimages. Perceptual map and set relation findings for all three religions suggest convergence between divine and self representations. When considered within the practices of particular religious communities (synagogues, mosques, and parishes), representations of the divine are likely to become blurred with self. Indeed, two fundamental dimensions of identity—agency and communion—are not easily distinguished in relation to a divine other that lacks physical properties. Future work should in some manner be enlarged to accommodate the complexity of prototypicality in religious experience.

This discussion raises an interesting possibility. Do the schema maps constructed for religious exemplars reflect goal-corrected partnerships with the divine? Attachment theorist John Bowlby (1969) argued that securely attached children grow to alter their schematic representations of caregivers. Schemas are similarly revised on the part of the caregiver. With the onset of developmental capacity for perspective-taking, children and parents construct shared schemas reflecting deeper security manifest in reciprocity and mutual negotiation. Bowlby (1969) defined this process in terms of a *goal-corrected partnership*. The close proximity between divine and self representations in exemplar schemas may reflect similar capacities

for perspective-taking on the part of individuals who perceive self in a religious other such as the divine. Even if the divine is prototypically represented in a manner that transcends physicality, individuals may through ritual and observance understand the divine in a goal-corrected sense, a partnership reflecting dynamic give-and-take. Indeed, exemplars from all three religions spoke extensively about their perceptions of divine expectations for behavior, relationships, and vocation. For adult exemplars with sophisticated theory of mind, it is possible that goal-corrected partnerships that initially emerged in the context of self-understanding with early caregivers are similarly constructed with the divine. The accoutrements of organized religion (ritual, worship, observances, and pilgrimage) may support this kind of goal-corrected religious self-understanding. In addition to the representational approach to schemas used in the present study, further work on religious self-understanding might explore the goal-corrected issue in terms of individual differences in dispositional traits and adaptations that reflect strivings (McAdams et al. 2004; McAdams and Pals 2006).

A final concern of the study relates to the manner by which cognitive schemas are evaluated in social context. In particular, underlying differences in schemas were considered in semantic space. A computational methodology was used to explore schemas with differences and commonalities noted between religions. This suggests a potentially useful methodological take on the manner by which schemas reflect a sense of adaptive proximity regulation in relationships (Bretherton 2005; Bretherton and Munholland 1999). Quantification of representations is historically difficult given the complexities of memory, affect, and meaning-making associated with schemas. Semantic knowledge affiliated with the organization of self and other representations can in LSA be considered individually or across groups, providing an exploratory basis for understanding schemas in terms of social influences. The method may represent a useful step toward more intentional study of cognitive representations between groups and longitudinally across the life span.

Along with these conclusions, several study limitations must be noted. The study considered religious self-understanding in nominated exemplars from three monotheist religions. By all accounts, exemplars are rare and structured interviews expensive, limiting the sample size for exploratory analyses of schemas. Moreover, exemplars were selected from monotheist religions. The religions sampled in this study are hardly representative of the diversity of religious experience in the world. The project did not consider animist, polytheist, pantheist, or panentheist experience or self-understanding. It is entirely possible that self-understanding conceptualized in terms of social intelligence is of diminished significance or outright irrelevance in the schemas of individuals from Shinto, Hindu, or tribal religious backgrounds. Finally, exploration of representations in religious self-understanding was premised on a novel methodology that is experi-

mental in applied cognitive and cultural research. Summary evaluation of these findings is tentative and subject to the replication of protocols incorporating computational analyses of natural language across group contexts.

NOTE

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