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Are Hindu Representations of the Divine Prototypically Structured?

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Although a great deal has been learned about the perceived attributes of God, systematic research on the cognitive structure of deity representations is lacking. Because extant research focuses almost exclusively on the Christian God, the present studies investigate the representation of deities in a polytheistic religion, Hinduism. Prototype theory informs 4 studies on how conceptualizations of Gods are structured. Using student and community samples, features of Gods are identified, feature centrality is documented, and centrality influence on cognition is evaluated. Studies 1 (feature identification task) and 2 (centrality rating task) produced considerable overlap in feature frequency documentation and feature centrality across the student and community samples, with "God is love" being the most frequently listed feature and most central feature in both samples. Study 3 showed that feature centrality influenced memory recall and recognition. Thus, cognitive representation of the divine in Hinduism is consistent with that of the prototype structure commonly found in the representation of natural objects. Study 4 identified boundary conditions for religious priming. Deity priming influenced ratings of central, but not peripheral, characteristics, only for respondents who rated themselves as closer to God(s). The implications of these results, especially for research on the impact of religious concepts on subsequent behavior, are discussed.

Keywords: cognitive representation, prototype, Hindu deities

Priming or making salient the concepts of God or religion has been shown to influence prosocial behaviors such as honesty (Randolph-Seng & Nielsen, 2007) and generosity (e.g., Henrich et al., 2010), an effect demonstrated across 93 studies involving 11,653 participants (Shariff, Willard, Andersen, & Norenzayan, 2016). Such findings are consistent with the widely accepted view that the manner in which knowledge is mentally represented impacts attitudes and behavior. With the recent growth in the cognitive science of religion (Barrett, 2007), research on schemas has provided a theoretical framework for investigating cognitive representations of deities. Schemas are cognitive structures comprising exemplars and prototypes that represent knowledge about a concept. They provide a system of organizing knowledge that influences expectations, attentional focus, and cognitive processes such as memory and decision-making (Baldwin, 1992; Fiske & Linville, 1980; Fiske & Taylor, 1991; Kleider, Pezdek, Goldinger, & Kirk, 2008: Rumelhart, 1980; Taylor & Crocker, 1981). In essence, schemas help determine how we perceive and interact with the world, influencing how we think and what we do.

Although progress has been made in work on religious schemas/concepts (e.g., Davis, Mauch, & Moriarty, 2013; McIntosh, 1995), it still largely reflects the impact of Guthrie's (Guthrie, 1993; Guthrie et al., 1982) pioneering work on the role of anthropomorphism for understanding theistic beliefs. Thus considerable effort has been expended on which human attributes are attributed to God and the conditions under which each occurs (e.g., Barrett & Keil, 1996; Shtulman & Lindeman, 2016). Another feature of this research domain is that, with a few notable exceptions (e.g., Barrett, 1998), the research has focused on monotheistic belief systems, in particular on the Christian God. Third, even though a great deal has been learned about the perceived attributes of deities, systematic research on the cognitive structure of deity representations is lacking (see Barrett, 2007). In light of these observations, the present studies investigate the representation of deities in what is widely regarded as a polytheistic religion, Hinduism. Specifically, showing that such representations can be characterized as a prototype will provide a central component in developing a potentially overarching religious schema (Rosch, 1975).

Prototype Approach

An effective method of assessing the structure of a mental representation is through prototype analysis. This approach provides an alternative to the classical view that category membership is determined by necessary and sufficient conditions in which a case either is or is not a category member. From this perspective, all members of a category are equally representative of the category. Rosch (1975) suggested that many natural language categories do not conform to this classical view and that concepts are internally structured into a prototype or a fuzzy collection of clustered features. In contrast to the classical view, the prototype approach involves identifying central features rather than critical features. This means that exemplars of a concept need not share all of the features of the prototype. Rather, members can be ordered in

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terms of the number of features they possess, particularly features that are central to the prototype. Thus, an animal is more likely to be categorized as a bird if it is similar to a prototypical bird such as a sparrow than if it is similar to a nonprototypical one such as a penguin. In sum, a prototypically organized concept has an internal structure in which some of its features are more strongly related or central to the concept than other more peripheral features.

Prototype theory has given us insights into many concepts that are central to understanding human behavior. For example, Sharpsteen (1993) found that participants were able to compile a list of prototypic features of romantic jealousy and that they were able to reliably rate the centrality of each of these features. Furthermore, participants' recognition of jealousy's features in a memory task and judgments of jealousy intensity were influenced by feature centrality.

Rosch (1975) identified two conditions that need to be met for a concept to manifest a prototype structure: (a) people must be able to identify its features and make meaningful judgments about the strength of a feature's association with the concept; they should be able to reliably rate their centrality to the concept and (b) the centrality of a feature should affect cognitive processes. These conditions provide a link between representational process and cognitions and behaviors (Kearns & Fincham, 2004; Lambert, Fincham, & Graham, 2011; Lambert, Graham, & Fincham, 2009). Thus activation of a prototype leads features closely associated with that prototype, central features, to be more readily accessible than features less closely associated, peripheral features (Cantor & Mischel, 1979). Thus in a memory task, activation of a God prototype would make it difficult for individuals to distinguish between central features of God that they are exposed to in a memory acquisition phase and central features not presented during this phase but still closely associated with the concept. In contrast, peripheral features are likely to be more easily distinguished as they are less closely associated with the concept of God. We would therefore expect that individuals will correctly recognize and recall more central features of God because central features should be more salient in memory than peripheral features. In addition, they should also be more likely to erroneously recognize and recall more central features. These predictions have been supported in prototype research involving memory recall and recognition tasks for other concepts (e.g., love, Fehr, 1988; forgiveness, Kearns & Fincham, 2004; gratitude, Lambert et al., 2011).

Why Hindu Representations of the Divine?

Hinduism is a multifaceted belief system in which one seeks to "achieve unity of one's spirit (atman) with the Supreme Being (Brahman)" (Tarakeshwar, 2013, p. 653) and involves different paths for doing so that are suited to different temperaments. As a polytheistic belief system, practitioners may have numerous gods (e.g., pertaining to the family and village) beyond those typically associated with Hinduism (e.g., Krishna, Vishnu, Shiva). However, little attention has been given to this complex belief system in the increasing number of studies that examine cognitive representation of the deity directly (see Barrett, 2011) or, as noted earlier, in the many more studies that investigate the impact of deity representation on various outcomes, including not only prosocial behavior but topics ranging from manuscript authorship to racial prejudice (Dijksterhuis, Preston, Wegner, & Aarts, 2008; Gervais, 2014; Johnson, Rowatt, & LaBouff, 2010). As a result, questions can be raised about whether current findings extend beyond the monotheistic belief systems that have been the primarily focus of this work.

Finally, it is assumed in the literature on the cognitive science of religion that thinking about supernatural agents does not represent a unique domain of human experience (Barrett, 2007; Xygalatas, 2016) but reflects common features of human cognition. But again, limited attention has been given to polytheistic belief systems. Thus, the current investigation of mental representation of the divine in Hinduism will potentially provide further evidence to support this assumption if it is shown that, like natural concepts, deity representation in Hinduism conforms to a prototype structure.

Research Overview

To progress beyond descriptive attempts to identify and define features associated with God(s) and deities (Barrett, 1998; Lindeman, Pyysiainen, & Saariluoma, 2002), the current research extends the use of prototype analysis to examine how conceptualizations of the divine are structured among Hindus. It serves to provide an understanding, for both laypersons and scientists, of the representational structure of Hindu God(s). This understanding will not only pertain to the features identified as important to the representation of the divine but also to the impact cognitive processes have on the assessment and construction of the representation.

The current studies address the following goals and research questions (RQ):

> Goal 1: To determine, via a prototype approach, the content of Hindu deity representations.
>
> RQ1: Will variability occur among individuals regarding deity features?
>
> RQ2: Given the diversity of Hindu deities, will individuals reliably rate the centrality of deity features?
>
> Goal 2: To determine how prototype structure affects cognition.
>
> RQ3: In respect to deity representations, will centrality ratings affect cognition?
>
> Goal 3: To determine whether visual priming of deities influences centrality ratings.
>
> RQ4: Will priming deity images affect centrality ratings?

Studies 1 and 2 (addressing Goal 1) examine feature frequency and feature centrality and use both undergraduate student (1a, 2a) and community adult (1b, 2b) samples. Study 3 (addressing Goal 2) examines how centrality of features influence cognitive processes for laboratory based cognitive tasks via recall and recognition memory tasks. Study 4 (addressing Goal 3) examines the impact of priming deity images on subsequent ratings of deity feature centrality.

Study 1a and 1b: Identification of Deity Features

In accordance with the prototype approach to investigating phenomena, the initial step consists of developing a list of features regarding the construct under investigation (e.g., Fehr, 1988; Fehr & Russell, 1984). Accordingly, Study 1 documents features that laypersons view as characteristic of God(s). Study 1a uses a sample of undergraduate students, whereas Study 1b uses a community sample of adults. Participants were instructed to list, in a free-response format, features perceived to be characteristic of their idea of God(s). Relating to RQ1, it was expected that discrepancies (variability) occur among participants regarding identification of features characteristic of God(s).

Method

Participants. Prior to study participation all participants gave informed consent as approved by the university's institutional review board. The sample for Study 1a was 106 undergraduate students attending a state university in Dharwad India. Student participants were recruited through campus advertisements and from classrooms as an option for voluntary extra class credit. Participants reporting that they did not believe in the existence of God (atheism, $n = 6$), were agnostic in their beliefs ($n = 1$), or who identified with monotheistic religious affiliations (e.g., Christianity, $n = 6$; Muslim, $n = 7$) were excluded from analyses, leaving 86 participants ($M_{age} = 22.31$ years, $SD = 1.49$, 61% female, 100% Hindu religiosity). The sample for Study 1b was 97 adults sampled through Amazon's Mechanical Turk. Participants who reported Hindu religiosity, Indian nationality, and were age >18 were included in the sample ($M_{age} = 31.79$ years, $SD = 9.40$, range = 18–69, 37% female).

Procedure. Through use of an online survey, participants were asked via a prompt (adapted from Lambert et al., 2011, May & Fincham, under review) to list features of their deity/deities in a free response format. Participants were shown the following prompt:

> This is a study on the characteristics and attributes that people think of when they think of God(s). Imagine that you are explaining God or the Gods to someone who has no knowledge or experience of God(s). Do God(s) have certain traits? Do God(s) act in certain ways? Please list characteristics that describe whatever or whoever you conceive God or the Gods to be. These can be written as single words or as extended descriptive phrases. The things you list do not have to be similar. You might, for example, describe each God somewhat differently. Write whatever comes to mind. Include the obvious. However, try not to just free-associate. We're interested in the way you think about God(s).

After participants were shown the prompt, they were presented with blank text windows to list features.

Results and Discussion

A verbatim list of features was compiled for each sample. The total number of individual responses was 1,643 for Sample 1a and 1,571 for Sample 1b. To organize responses and group features into parsimonious linguistic units, a sorting procedure used by Fehr (1988; see also Lambert et al., 2009; Rosenberg & Jones, 1972; Rosenberg & Sedlak, 1972) was used. First, duplicate responses were eliminated followed by extraction of monoleximic items. Phrases or sentences were judged as to whether the phrase or sentence in question referenced only a single feature, or whether it could be divided (coded) into two or more linguistic units (attributes). Features prefaced or followed by a simple modifier or a longer descriptive phrase were coded as a single feature (e.g., "very understanding" coded as "understanding" and "He is a healer" coded as "healer"). This resulted in 202 linguistic units for Sample 1a and 187 for Sample 1b.

Following the second step in Fehr's (1988) procedure, two research assistants independently placed linguistic units into attribute categories. Linguistic units were listed as the same attribute only in cases for which (a) they were merely different as grammatical forms of the same word or (b) they were judged to be similar or identical in meaning. Responses judged to be similar or identical in meaning were collapsed into one attribute category according to conservative standards (e.g., "comforter," "comforting," "comfort" all coded as "comforter"). Based on these criteria, 156 attribute categories were identified in Sample 1a and 149 in Sample 1b. Interrater reliability was indexed by Cohen's Kappa (which takes into account chance agreement by raters) and was demonstrated to be acceptable, K = .77 for Sample 1a and K = .79 for Sample 1b. Discrepancies occurring between coders were resolved by a third coder. Finally, idiosyncratic responses were excluded. Only features listed by at least two or more respondents were retained. One hundred eight features were retained for inclusion in sample 1a and 153 in sample 1b. The frequency scores of these features was computed and indexed by percentage of participant responses (see Table 1).

In support of expectations for RQ1, considerable variability occurred among individuals regarding features identified as characteristic of God(s). This demonstration of feature variability is consistent with a prototypic structure as opposed to a classical conception based on necessary and sufficient features of a concept. Although no one feature was identified by all participants, in both samples "love" was identified as the most frequently endorsed feature characteristic of God(s). In fact, substantial overlap occurred for the endorsed items between the samples. Comparing the features identified between the samples, only 15 unique features appeared in the student sample and 10 in the community sample. Furthermore, the top two most frequently reported features receiving nearly identical endorsement ("love" at 92% vs. 89%, "truth" at 49% vs. 51%). Although it may appear redundant to have both student and community samples given the similarity of findings, inclusion of diverse samples (in terms of demographics) allows for greater confidence in the representativeness of the deity features identified within Hindu religiosity.

In addition to the Hindu deity attributes, 57 named deities were identified over the two samples. However, with the exception of three specific deities (Ganesha/Vinayaga, Saraswati, and Lakshmi, all around 3% in both samples), named deities were reported idiosyncratically. Although specific deities are not referencing specific deity attributes or features, the centrality of all named deities was also examined for exploratory purposes in Study 2.

Study 2a and 2b: Centrality Ratings

Once features are identified as representative of a concept, prototype theory requires that individuals must also make mean-

Table 1
Deity Feature Listings and Centrality Ratings for Undergraduate Student Samples and Community Samples in Studies 1 and 2 in Order of Centrality

Sample and deity features	% of respondent reports	*M* centrality	*SD*
Student sample			
Love	92%	1.16	.70
Truth	49%	1.24	.75
Honest	29%	1.24	.73
Trust	30%	1.25	.77
Peace	25%	1.26	.84
Safe	9%	1.31	.96
Good	12%	1.33	1.05
Hope	12%	1.34	1.08
Understanding	10%	1.36	1.03
Energy[a]	10%	1.38	1.03
King/ruler	6%	1.38	1.17
Light	8%	1.38	1.11
Believe	5%	1.40	1.27
Life	7%	1.40	1.22
Creator	6%	1.40	1.18
Guardian/protector	25%	1.42	1.20
Sunshine	3%	1.43	1.10
Nature	8%	1.43	1.01
Empowering	6%	1.45	1.10
Perfect	5%	1.45	1.30
Patience	7%	1.47	1.19
Helpful	5%	1.49	1.23
Eternal	11%	1.49	1.30
Courageous	3%	1.49	1.31
Righteous	3%	1.51	1.25
Holy	20%	1.52	1.35
Teacher	4%	1.52	1.42
Omnipotent	33%	1.55	1.36
Faith	14%	1.55	1.52
Simple[a]	1%	1.56	1.33
Humble	2%	1.62	1.50
Freedom[a]	3%	1.62	1.57
Savior	3%	1.63	1.57
Forgiving	17%	1.63	1.43
Worthy	13%	1.65	1.51
Fulfilling	5%	1.66	1.28
Omnipresent	26%	1.69	1.70
Calm[a]	6%	1.70	1.60
Moral	3%	1.70	1.54
Prayers	31%	1.73	1.48
Omniscient	28%	1.74	1.53
Predestined	3%	1.75	1.56
Approachable[a]	4%	1.75	1.55
Comforter	7%	1.77	1.36
Worship	27%	1.79	1.86
Accepting	10%	1.79	1.43
Miracles	2%	1.81	1.63
Giving/generous	9%	1.81	1.54
Glory	2%	1.82	1.80
Sovereign	1%	1.85	1.58
Amazing	5%	1.87	1.68
Infinite	13%	1.88	1.89
Judge	2%	1.89	1.61
Father	6%	1.90	1.90
Joy/happy	17%	1.92	1.65
Alive	4%	1.94	1.74
Intelligent	11%	1.99	1.95
Listener	10%	2.00	2.00
Healer	3%	2.02	1.82
Consuming	2%	2.05	1.99
Compassionate	10%	2.05	1.61
Sacrifice	4%	2.06	1.99
Beautiful	7%	2.06	2.01
Mother	8%	2.10	2.05
Spiritual	19%	2.10	1.99
Friend	4%	2.12	2.13
Active	1%	2.16	2.04
Selfless	3%	2.25	2.15
Condemnation	2%	2.26	1.94
Invincible[a]	9%	2.45	2.27
Formless[a]	11%	2.53	2.10
Angels	2%	2.61	2.37
Grace	2%	2.65	2.38
Masculine	9%	2.68	2.44
Relationship	8%	2.68	2.20
Invisible	4%	2.69	2.47
Church	1%	2.78	2.24
Proven	3%	2.80	2.56
Sharing	2%	2.89	2.41
Indescribable	8%	2.95	4.14
Human-like[a]	10%	3.07	2.64
Polytheistic	6%	3.19	2.78
Trinity	5%	3.25	2.58
Religion	6%	3.42	3.00
Martyr	1%	3.66	1.99
Afterlife	6%	3.75	2.64
Pain	1%	3.80	2.69
Restrictive[a]	1%	3.93	2.79
Social construct	3%	4.22	3.06
Genderless	2%	4.27	3.05
Cold[a]	4%	4.36	2.93
Undeserving	3%	4.42	2.81
Angry[a]	3%	4.64	2.64
Weak	1%	4.85	2.64
Unbelievable	4%	4.91	2.49
Unknown	5%	5.05	2.72
Feminine	6%	5.15	2.86
Distant[a]	2%	5.19	2.78
White	1%	5.20	2.71
Fabricated	1%	5.59	2.62
Detached[a]	3%	5.69	2.56
Sin	3%	5.86	2.63
Unfair	2%	5.98	2.64
Misunderstood	4%	6.39	2.19
Cruel[a]	3%	6.61	2.22
Racism	1%	6.64	2.39
Fun[a]	3%	6.78	1.85
Jealous	1%	7.20	1.64
Community sample			
Love	83%	2.06	1.96
Truth	51%	2.34	1.95
Parental[a]	17%	2.37	1.93
Peace	19%	2.39	1.81
Perfect	9%	2.44	1.83
Worthy	16%	2.46	1.85
Understanding	12%	2.48	1.86
Safe	10%	2.48	1.88
Supportive[a]	5%	2.48	1.24
Trust	26%	2.49	1.97
Hope	14%	2.50	1.97
Good	14%	2.52	2.11
Patience	18%	2.55	1.84
Nature	7%	2.57	1.87
Teacher	5%	2.57	2.04
Guardian/protector	27%	2.58	1.84
Honest	26%	2.61	1.96

(*table continues*)

Table 1 (*continued*)

Sample and deity features	% of respondent reports	*M* centrality	*SD*
Moral	11%	2.62	1.89
Good listener	7%	2.62	2.03
Humble	2%	2.65	1.87
Giving/generous	8%	2.65	2.05
Forgiving	20%	2.67	1.98
Helpful	9%	2.69	2.01
Miracles	4%	2.72	1.93
Light	2%	2.72	1.91
Sunshine	1%	2.72	1.99
Responsive[a]	4%	2.73	1.49
Life	5%	2.73	1.98
Grace	3%	2.73	2.00
Internal[a]	7%	2.76	1.51
Predestined	1%	2.76	1.99
Faith	3%	2.77	2.10
Friend	6%	2.78	2.04
Righteous	2%	2.78	2.02
Fair[a]	7%	2.80	1.70
Omnipotent	31%	2.80	2.15
Relationship	11%	2.81	1.90
Glory	4%	2.82	1.99
Joy/happy	18%	2.82	2.00
Worship	25%	2.83	2.05
Health[a]	6%	2.83	4.02
Fulfilling	4%	2.84	1.98
Creator	3%	2.84	2.29
Spiritual	18%	2.85	1.94
Savior	2%	2.85	1.97
Holy	22%	2.86	1.96
Believe	2%	2.87	2.27
Intelligent	7%	2.90	2.02
Healer	5%	2.93	1.98
Courageous	2%	2.93	2.04
Infinite	9%	2.95	2.13
Prayers	28%	2.97	2.09
Active	1%	3.00	2.11
Judge	1%	3.01	1.93
Omnipresent	24%	3.02	2.19
Amazing	3%	3.03	2.22
Alive	2%	3.03	2.18
Social construct	1%	3.06	1.90
Eternal	11%	3.07	1.91
Empowering	4%	3.07	1.91
Compassionate	12%	3.09	1.98
Omniscient	28%	3.09	2.13
Sacrifice	4%	3.10	2.08
Selfless	2%	3.12	2.21
Sharing	2%	3.12	1.83
Invisible	4%	3.13	2.11
Sovereign	6%	3.13	1.94
Religion	15%	3.17	2.31
Accepting	7%	3.19	2.06
King/ruler	4%	3.20	2.13
Comforter	3%	3.22	2.04
Indescribable	7%	3.23	1.95
Father	6%	3.27	2.19
Beautiful	10%	3.36	2.40
Consuming	2%	3.41	2.00
Polytheistic	20%	3.44	2.16
Undeserving	1%	3.50	2.22
Trinity	6%	3.59	2.02
Afterlife	19%	3.62	2.27
Proven	2%	3.65	2.33
Died[a]	1%	3.66	1.99
Angels	2%	3.72	2.32
Mother	4%	3.87	2.27
Masculine	3%	3.88	2.18
Church	8%	3.90	2.10
Genderless	2%	4.02	2.31
Feminine	6%	4.06	2.20
Condemnation	2%	4.11	1.95
Fabricated	2%	4.11	2.17
Wealth[a]	5%	4.21	2.75
Unknown	3%	4.37	1.98
Unfair	2%	4.38	2.28
Pain	1%	4.40	2.09
Weak	3%	4.44	2.18
Unbelievable	4%	4.47	1.95
Martyr	2%	4.50	1.98
White	1%	4.59	2.33
Sin	2%	4.62	2.19
Inaccessible[a]	4%	4.73	2.97
Misunderstood	2%	4.77	2.32
Racism	2%	5.23	2.36
Jealous	2%	5.23	2.29
Critical[a]	1%	5.28	5.57

[a] Unique feature.

ingful judgments about whether the features are central or peripheral to the concept. In addition, there must be considerable agreement regarding the centrality judgments. Therefore, Study 2 identifies features rated as more central, or more peripheral to the concept of God(s) and evaluates the agreement between raters of these judgments. Relating to RQ2, it is expected that (a) individuals reliably rate the centrality of identified features and (b) produce a relationship between feature frequency and centrality rating.

Method

Participants. All participants gave their written informed consent prior to study participation as approved by the university's institutional review board. The sample of Study 2a was 159 undergraduate students attending a state university in Dharwad, India. Students were recruited through campus advertisements and from classrooms as an option for voluntary class credit. Participants reporting disbelief in the existence of God (atheism), agnostic belief, or monotheistic religious affiliations (e.g., Christian, $n = 4$; Muslim, $n = 11$) were excluded from analyses, leaving 144 participants ($M_{age} = 22.16$ years, $SD = 1.17$, range = 18–25, 74% female, 100% Hindu religiosity). The sample of Study 2b was 123 adults sampled through Amazon's Mechanical Turk. Participants that reported Hindu religiosity, Indian nationality, and age >18 were included in the sample ($M_{age} = 33.16$ years, $SD = 9.49$, range = 18–69, 24% female).

Procedure. Using features identified in Study 1, participants were asked to rate features for their centrality. They were asked how well each feature characterized God(s) using an 8-point scale ranging from 1 (*very central/very important*) to 8 (*not central/not important*). For half of the participants, features were presented in reverse order. Participants were shown the following prompt:

> In a previous study, we asked people to tell us their views on God(s). Specifically, we asked them to "list the characteristics or attributes of God(s) that come to mind." Below are the responses of some of the

people in our earlier study. Please read each of the descriptions of God(s) below. After you have read each one, please rate how central or important you think each of the features are to the concept of God(s).

Results and Discussion

Mean centrality ratings were computed for each feature (see Table 1). To evaluate the reliability of the means an intraclass correlation coefficient (ICC), which is equivalent to the mean of all possible split-half correlations of the all the participants with respect to the features, was computed. An additional analysis, based on a flipped data matrix and treating the features as cases and the participants as items, was used to produce an index of the internal consistency of the ratings (similar to Cronbach's alpha). Pearson correlations evaluated the relationship between feature frequency and centrality.

Findings provide strong evidence regarding the reliability of these means as indicated with high ICC values (.95, $p < .001$ in Sample 2a; .93, $p < .001$ in Sample 2b) and high internal consistency of the ratings from the flipped data matrix analyses ($\alpha = .96$ in Sample 2a; $\alpha = .97$ in Sample 2b). Evaluation of the relationship between the mean centrality ratings (with reversed scoring) with the frequencies from Study 1 indicated a significant relationship in both samples ($r = .35$, $p < .001$ in Sample 2a; $r = .41$, $p < .001$ in Sample 2b), with higher frequencies corresponding to a greater central rating of the feature. Plus, there appears to be substantial overlap in the centrality ratings (three out of the top five most highly central features of the student sample appear in the top five items of the community sample). However, of note, the student sample did report a significantly greater mean centrality rating for all features ($M = 2.61$, $SD = 1.53$) in comparison to the community sample ($M = 3.20$, $SD = 0.72$), $F(1, 265), = 12.70$, $p < .001$, partial $\eta^2 = .057$.

The findings indicate that individuals from both samples (a) identified certain features as more prototypical of God(s) than others, (b) agreed on these ratings, and (c) produced a relationship between feature frequency and centrality rating, thus summarily supporting the expectation relating to RQ2. These findings therefore fulfill the first condition Rosch (1975) identified as necessary for a concept to display a prototype structure; identification of concept features and reliable rating of feature centrality.

In regards to named deity centrality ratings, no named deity would have been in the highest 20 feature centrality rankings in Sample 2a (Ganesha/Vinayaga was the most centrally rated at $M = 1.52$, $SD = 1.64$). In Sample 2b, only Ganesha/Vinayaga ($M = 2.53$, $SD = 2.27$), Saraswati ($M = 2.54$, $SD = 2.19$), Lakshmi ($M = 2.55$, $SD = 2.23$), and Shiva/Mahadev ($M = 2.60$, $SD = 2.31$) would have been in the highest 20 feature centrality rankings.

Study 3: Influence on Cognition: Recall and Recognition Memory Sentence Completion Tasks

In accordance with prototype theory (Rosch, 1975), if deities are prototypically structured, we would expect that the content of this concept to affect cognition. Thus Study 3 evaluates RQ3, how feature centrality affects thinking about God(s), via sentence completion tasks to examine recall and recognition memory. In this study individuals viewed a series of central and peripheral deity statements (acquisition task) followed by a distractor task and then a recognition sentence completion task ("God(s) is/are ____", e.g., omnipotent) asking them whether they had seen the statement during the acquisition phase.

In line with prototype theory, it was expected that for recall (a) central deity features would be correctly recalled more often than would peripheral deity features and (b) central deity features that had not been presented during the acquisition phase would be falsely recalled more often than would peripheral deity features. Regarding recognition, it was expected that for the presented items, (a) central deity features would be correctly recognized more often than would peripheral deity features and that (b) that central deity features that were not presented during the acquisition phase would be falsely recognized more often than would peripheral deity features.

In this study we used the centrality ratings established in Study 2a and classified features as either central (higher centrality rating) or peripheral according to a median split, in accordance with the methodology of previous prototype research (Kearns & Fincham, 2004; Lambert et al., 2009, 2011). However, it is important to note that centrality should be considered to be on a continuum and not thought of dichotomously. Although necessary for the current research purposes, we recognize that the division of features is artificial and not meant to imply that there is a clear boundary delineating central and peripheral features.

Method

Participants. All participants gave their written consent prior to study participation as approved by university institutional review board. The sample comprised 157 undergraduate students attending a state university in Dharwad India. Student participants were recruited from classrooms as an option for voluntary extra class credit. Participants reporting atheist or agnostic beliefs ($n = 4$) or who identified with monotheistic religious affiliations (e.g., Christian, $n = 7$; Muslim, $n = 10$) were excluded from analyses, leaving 136 participants ($M_{age} = 22.78$ years, $SD = 1.84$, 53% female, 100% Hindu religiosity).

Method. Participants completed an acquisition task followed by a recall and recognition sentence completion task (adapted with modification from Kearns & Fincham, 2004). Recall and recognition tasks were conducted within-subjects.

Acquisition task. Participants viewed a series of God(s) statements (acquisition phase) that were presented by a research assistant via paper material. The research assistant instructed the participant to read each statement aloud. They were instructed to pay attention to the statements as they would later be asked questions about them. Each statement ("God(s) is/are ____", e.g., omnipotent) was constructed by randomly selecting 20 peripheral features and 20 central features obtained in Study 2. Statements were randomly divided into two groups with each comprising 10 central and 10 peripheral statements. Half of the participants received one set of 20 statements (Group 1) and the other half received a different set of 20 statements (Group 2). Each group viewed the statements in a different random order. After viewing the statements, participants engaged in a short (4 min) interference task (listing in alphabetical order as many countries in the world as possible).

Recall task. Following the acquisition phase, participants were instructed to recall, in 3 min, as many of the statements as possible. Three judges coded participant responses. No cases occurred where judges disagreed on response items. Items not corresponding to the deity prototype materials were eliminated from analyses. The number of correctly recalled central and peripheral features as well as the number of incorrectly recalled central and peripheral features were computed resulting in four scores for each participant.

Recognition task. Following recall and a distractor task (list as many countries in the world for 4 min), each participant was presented with a set of 40 statements. The statements consisted of 20 statements that the participant had read during the acquisition phase as well as the 20 statements that had been presented to the other half of the participants. The participant was instructed to indicate whether they had seen the statement during the acquisition segment via a paper survey with each statement listed with a yes/no checkbox response. The full feature list was portrayed to ensure measurement of recognition and not recall.

Results and Discussion

A mixed factorial analysis of covariance (ANCOVA) was conducted to examine if recall and recognition memory ratings varied as a function of attribute centrality (central or peripheral), with group (A or B) as a between-subjects variable and centrality condition as the within-subjects variable. Religiousness served as a covariate in the analyses.

Recall memory. The first prediction was that central features would be correctly recalled more often than peripheral features. This prediction was supported as participants correctly recalled an average of 3.45 (SD = 1.92) out of 10 central features as opposed to an average of 2.86 (SD = 1.64) peripheral features, $F(1, 133) = 7.32$, $p = .008$, partial $\eta^2 = .074$. The second prediction was that central features that had not been presented during the acquisition task would be erroneously recalled to a greater extent than would peripheral features. This prediction was also supported with an average of 2.96 (SD = 1.14) central features falsely recalled as opposed to an average of 1.17 (SD = 1.11) peripheral features, $F(1, 133) = 179.90$, $p < .001$, partial $\eta^2 = .662$. There were no other significant main effects or interactions, nor was religiousness found to be a significant covariate ($p < .05$).

Recognition memory. The first prediction was that for presented features, central features would be correctly recognized more than peripheral features. This prediction was supported as an average of 8.11 (SD = 2.03) out of 10 central features were correctly recognized in comparison to an average of 7.19 (SD = 1.62) peripheral features, $F(1, 133) = 11.46$, $p < .001$, partial $\eta^2 = .111$. The second prediction for recall memory was that central features that were not presented during the acquisition task would be falsely recognized more often than peripheral features. Again this prediction was confirmed with an average of 4.58 (SD = 2.16) out of 10 central features being falsely recognized as opposed to an average of 2.16 (SD = 1.78) peripheral features, $F(1, 133) = 65.92$, $p < .001$, partial $\eta^2 = .417$. As with the recall scores, there were no other significant main effects or interactions, nor was religiousness found to be a significant covariate ($p < .05$) for recognition memory scores.

Findings indicate that the centrality of features influenced cognition in respect to God(s). These findings therefore fulfill the criteria necessary for demonstrating that God(s) is prototypically organized. The predictions of prototype theory were supported in that central features were correctly recognized/recalled more often than peripheral features and central features that were not presented during the acquisition phase were falsely recognized/recalled more often than peripheral ones.

Study 4: Deity Priming

Having demonstrated that representation of the divine in Hinduism meets the criteria for prototype representation a final study was conducted to determine whether religious priming would influence centrality ratings. Although the study was an exploratory one, it was anticipated that deity priming might particularly influence central characteristics, compared to peripheral ones, given their stronger associative strength with God(s). Given that closeness to God(s) likely varies across individuals this was also assessed as a control variable.

Method

Participants. Prior to study participation all participants gave informed consent as approved by the university's institutional review board. The sample comprised 96 adults recruited through Amazon's Mechanical Turk. Participants who reported Hindu religiosity, Indian nationality, and were age >18 were included in the sample (M_{age} = 31.11 years, SD = 10.59, range = 18–69, 34% female).

Procedure. Through use of an online survey, participants were first asked questions assessing for demographics, including the Inclusion of God in the Self Scale (IOG; Hodges, Sharp, Gibson, & Tipsord, 2013). This scale was adapted from the Inclusion of Other in the Self Scale (Aron, Aron, & Smollan, 1992) which is widely used as a measure of closeness. In the present study, the word "other" was replaced with God(s). Therefore, in each pair of circles, one was labeled "Self" and the other "God(s)". Participants were asked to select the pairing that best illustrates their relationship with God(s). Ratings ranged from 1 (*two circles that were completely separate*) to 7 (*two circles that were almost completely overlapping*).

Participants were then told that the researchers were trying to pilot test qualities of pictures and needed assistance. Participants were asked to respond to the following question, "How accurately does this image portray your personal view of your God/s?", rated on a 5-point scale ranging from 1 (*not at all accurate*) to 5 (*completely accurate*). There were two blocks of pictures (one block of four control images and one block of four Hindu deity images). A series of 10 feature centrality ratings were then randomized to occur after either the control image ratings (in half the sample) or the Hindu deity image ratings (other half of the sample). For the centrality ratings, 10 statements ("God(s) is/are ____" e.g., omnipotent) were constructed by randomly selecting five peripheral features and five central features as obtained in Study 2. Participants were asked in random order how characteristic each statement was of their personal understanding of their God(s) using a 6-point scale ranging from 1 (*not at all characteristic*) to 6 (*completely characteristic*). The responses coded to indicate that

higher scores reflected that features were more characteristic (central).

Results and Discussion

As a manipulation check, paired-samples t test of the composite scores of image ratings indicated that Hindu deity images (M = 11.88, SD = 3.28) were rated as significantly more accurate of one's personal view of God(s) than control images (M = 15.29, SD = 4.66), $t(95) = 14.15$, $p < .001$, Cohen's $d = 1.780$. To evaluate if seeing a deity image (vs. a control image) prior to making centrality ratings influenced centrality, a 2 (control image vs. deity image) × 2 (central feature vs. peripheral feature) mixed between-within subjects ANCOVA (controlling for self-God overlap via IOG scale) was conducted. Results indicated that self-God overlap interacted with image presentation on centrality ratings, $F(1, 88) = 6.78$, $p = .011$, partial $\eta^2 = .072$.

As a follow-up analysis to the self-God interaction, participants were classified as either low or high in self-God overlap via a median split on the IOG scale. This classification was then added to the 2 (control image vs. deity image) × 2 (central feature vs. peripheral feature) × 2 (low vs. high self-God overlap) mixed between-within subjects analysis of variance. Findings indicated a significant three-way interaction, $F(1, 91) = 11.12$, $p = .001$, partial $\eta^2 = .113$. As can be seen in Figure 1, post hoc contrasts indicate that for participants reporting lower self-God overlap, there was no interaction ($p > .05$) between centrality feature (central vs. peripheral) and priming conditions for centrality ratings. However, for participants reporting higher self-God overlap, priming of a deity (as opposed to seeing control images) lead to significantly ($p < .05$) greater centrality scores (i.e., the feature being more characteristic of the divine) for central features than for peripheral features (Cohen's $d = .681$).

Although initially included only as a control variable, closeness to God(s) proved to be of substantive importance in that it interacted with the experimental manipulations. Specifically, deity priming only influenced the rating of central characteristics for respondents who rated themselves as closer to God(s). In contrast, closeness to God(s) had no impact on ratings of peripheral characteristics. This is an important finding as it identifies boundary conditions for religious priming; concern has arisen regarding the reliability and boundary conditions of religious primes (Ritter & Preston, 2013; Shariff et al., 2016).

General Discussion

Noting recent growth in the cognitive science of religion (Barrett, 2007), particularly burgeoning research interest on the impact of priming the concept of God on subsequent behavior, the present studies sought to advance understanding of the mental representation of God. Because prior research has focused on monotheistic belief systems, in particular the Christian God, the studies reported investigate the representation of deities in what is widely regarded as a polytheistic religion, Hinduism. A further distinguishing feature of the research is that it is the first to use prototype theory to examine the structure of mental representation of the divine.

Consistent with prototype theory both undergraduate students and lay adults exhibited considerable variability regarding features identified as characteristic of God(s) with very substantial overlap across the two samples in the features identified (177 out of 202 or 88.6%). In a similar vein, both samples were able to reliably rate the extent to which the features identified were central to the concept of God(s). Also, in each sample there was a significant correlation between ratings of feature centrality and the frequency with which features had been previously identified. Of the 20 features rated as most central to the concept of God(s) in each sample, 12 overlapped: love, truth, honest, trust, peace, safe, good, hope, understanding, guardian/protector, nature, and perfect. Furthermore, in each sample both love and truth received the highest percentage of feature endorsement and highest centrality ratings. Thus, love and truth emerged as the most prominent and defining features of participants' mental representation of their Hindu God(s).

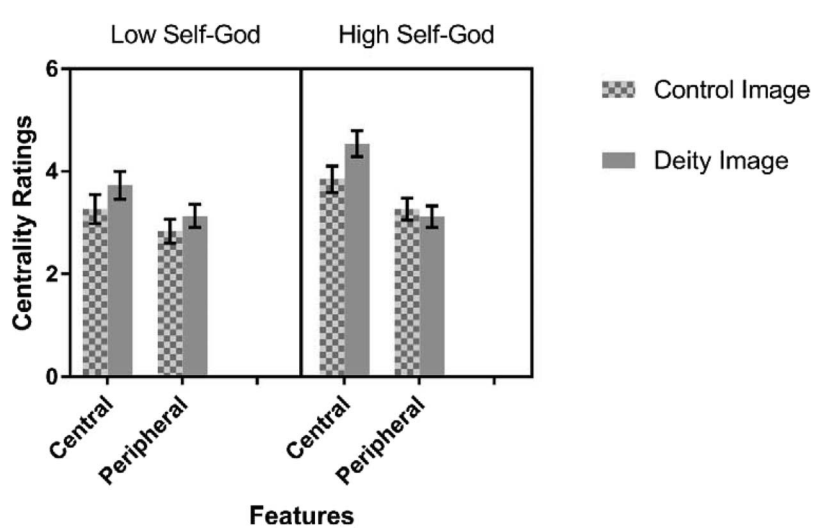

Figure 1. Mean centrality ratings by self-God overlap, image type, and centrality feature with 95% confidence interval.

These findings satisfy the first condition needed for a concept to display a prototypic structure, namely, respondents must be able to identify its features, make meaningful judgments about the strength of a feature's association with the concept and be able to reliably rate their centrality to the concept. The inclusion of student and lay samples is also noteworthy in that it not only replicates findings but also allows for greater confidence in the representativeness of the deity features identified within Hindu religiosity.

Given the similarity of findings across samples, the second criterion for prototype identification, that the centrality of features should affect cognitive processes, was examined using undergraduate student samples only. This was done by examining whether feature centrality affects cognitive processes, namely, recall and recognition memory. Consistent with prototype theory central features were correctly recalled/recognized more often than peripheral features and central features that were not presented during the acquisition phase were falsely recalled/recognized more often than peripheral ones. Thus, the second condition needed for a concept to display a prototypic structure was met.

The present studies show that the cognitive representation of the divine in Hinduism is consistent with that of the prototype structure commonly found in the representation of natural objects. This provides further evidence that thinking about supernatural agents does not represent a unique domain of human experience (Barrett, 2007; Xygalatas, 2016) but reflects common features of human cognition. In the present case, this may appear to be particularly noteworthy given the immense diversity found in Hinduism and the fact that a specific belief about God or gods is not an essential component of this belief system. However, it is perhaps not so surprising in light of an oft quoted observation in the oldest Hindu text, the Rigveda, "ekam sad vipra bahudha vadanti agnim yamam matariswanam ahuh" (Rigveda Samhita 1.164.46) which roughly translated means, "Truth is one, but the learned refer to it in different names." This points to an underlying unity in Hinduism which may appear to run counter to the Western view that it is a polytheistic religion. Indeed, philosophers such as Jeaneane Fowler have argued that monism, monotheism, polytheism, and pantheism are all reflected in the many facets of Hinduism (Fowler, 1997) making it difficult to classify Hinduism as any one belief system.

Notwithstanding the many deities found in Hinduism, an exploratory study showed that deity priming among Hindu participants was possible using only four deity images. Specifically, deity priming influenced ratings of deity central characteristics compared to peripheral ones. However, an important boundary condition for this effect occurred as it only emerged for those who rated themselves as relatively closer to their deity/deities. The fact that closeness to God/gods influenced priming is likely to inform understanding of inconsistent findings in the literature on religious priming (see Shariff et al., 2016).

The above finding, however, needs to be interpreted in light of the doctrine of the chosen deity (Ishta Devata) found in Hinduism. This doctrine allows each person to choose (or invent) a version of Brahman consistent with their spiritual needs given the doctrine of spiritual competence (Adhikara). In light of this personalization of the deity/deities, it is possible that the boundary condition reported for priming regarding closeness to the deity/deities is unique to Hinduism. It will therefore be important to replicate this finding in avowedly monotheistic religions such as Christianity or Islam which include dogma regarding the nature of the deity.

Overall, the findings of this research contribute to a growing literature in the cognitive science of religion that focuses on mental representations of the deity. They are notable for being among very few that do not investigate representation of the Christian God and are the first to show that the mental representation of deity/deities in any religion satisfy the conditions that need to be met for a concept to manifest a prototype structure.

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