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Cognitive Architecture, Humor and Counterintuitiveness: Retention and Recall of MCIs

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Abstract
The recent surge of interest in the cognitive science of religion has resulted in a number of studies regarding the memorability of minimally counterintuitive ideas (MCIs). The present model incorporates ontological templates and their respective inferences, as well as delineates between two major types of violations: schema- and template-level violations. As humor is also defined by its counter-intuitiveness at the schema level, this study was designed to find effects this emotion has on retention. Results suggest that humorous statements with parallel violations are recalled significantly better than statements which have only template-level violations, affective statements with only schema-level violations, as well as intuitive statements in both immediate and 1-week follow-up sessions.

Keywords
MCI concepts, humor, memory, schemas, templates

Cognitive Architecture and MCIs

Background

Research regarding how cognitive structures influence cultural transmission has been ever-increasing. Influenced by Bartlett (1995 [1932]), who was concerned with understanding how people remembered stories that were completely foreign to their regular experience, the recent focus of cultural transmission considers counterintuitive ideas "catchier" than others (Sperber, 1996), thus paying closer attention to the cognitive mechanisms which serve as the impetus for better retention when violated (Boyer & Ramble, 2001; Norenzayan et al., 2006). Cognitive anthropologists attempting to understand the relation between mind and religion have identified particular types of ideas which are "catchier" because of our cognitive architecture. However,

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such studies have ignored or minimized the role emotion plays in the retention of counterintuitive concepts.

Templates and Domains

Boyer (1994) articulated the argument for the "naturalness" of religious ideas insofar that the "counterontological" (Boyer, 2001: 65) nature of such ideas is made possible by default reasoning mechanisms, or templates. Evidence from developmental psychology suggests that very young children reason about entities in various domains in very similar ways and attribute a number of inferences to objects in these categories with little, if any, empirical evidence to support such intuitions (Keil, 1996; Bloom, 2007). Such conceptual domains – PERSON, PLANT, ARTIFACT, ANIMAL (Boyer, 1998; Barrett, 2000) – and their concomitant inferences are what Boyer and Ramble call "ontological templates" (Boyer, 2001; Boyer & Ramble, 2001), mechanisms which serve to construct and maintain an intuitive way of organizing and making inferences about objects in the world around us. While ANIMALs, PERSONs and PLANTs have immutable species membership, ARTIFACTs have an essentialized function. PLANTs and ARTIFACTs do not move on their own accord whereas PERSONs and ANIMALs have internal motivational states which drive their behavior. All objects which fall in these categories can not pass through other solid objects, levitate, or transform into other objects. When these deep assumptions are altered, we violate the inferences governing our knowledge about our world.

There are two ways in which templates' assumptions can be violated: breaches and transfers (Boyer, 2000; Boyer & Ramble, 2001; Barrett, 2008). Breaches are simply representations that contain a violation of one of the default inferences of a template (e.g., "an armadillo that can walk through walls" violates intuitive physics about ANIMALS). On the other hand, transfers are the application of an intuition appropriate to one template to an object belonging to another template (e.g., "a flower with beliefs" attributes agency – an inference made about animate entities – to an inanimate PLANT). Violations may also occur, however, at what we may call the schema-level of human cognition (see below). Berlin (1981) demonstrated that while the Aguaruna, for example, do not have a lexical marker for the category "plant", the conceptual equivalent nevertheless exists as fungi are not "considered to fall within the domain" of related plants. This suggests that the category has particular attributes and a word for "plant" is not necessary to have the category. Assuming that the Aguaruna also have default inferences for those objects that fall in the PLANT template just as we do, the fact that fungi are not thought of as related to plants does not suggest that there are essential components to fungi

that are not fulfilled in the PLANT template, but rather a learned association which takes place at another level of human cognition, namely schemas.

Schemas and Conceptual Units

There are a number of components which serve to distinguish templates and schemas (Purzycki & Sosis, in press). Templates are inference-generating programs for objects which "fit" into them whereas the schemas are used to provide specific, related information regarding a particular informational object, action, protocol, etc. Schemas are specific, hierarchically-structured informational units that are strictly learned. The relationships between such units are more or less flexible (D'Andrade, 1992; Strauss & Quinn, 1997: 48-84; Brewer, 2000; Bechtel & Abrahamsen, 2002) and ultimately link these ontological domains and respective inferences together in a complex network of units. While a "default value" (D'Andrade, 1995: 124), for instance, concomitant to "rose" is likely to be "red" because of our schema of rose, this is not a default inference of the PLANT domain, nor is it particular to all objects which this template serves to inform. Templates are far more general and serve to provide inferences essential to the objects. The inferences "contained within" templates are appropriate inferences for objects within these categories.

Another component to schemas is, as cultural units, we can create wholly new schematic domains such as "science fiction Western romance novels" and "things you can do when in Christiania" and appropriately/inappropriately apply extant information to them. With templates, our minds are already equipped with the means to make sense of the world. As with the case of language, if we are raised in a linguistic population, then our language faculty "grows" (Chomsky, 1980: 33). Likewise, the seeds or skeletal systems of ontological templates "grow" in such a manner, and the attributes that are inferred crystallize, forming more or less concrete ontological templates (Gelman, 1990; Boyer, 2001: 115).

We may also consider the idea that we have a schema for "plant", but such learned associations correlated to the concept are not necessarily essential to all objects that correspond to the template. For example, we may think of "leaves" and "sunlight" and "water" immediately upon thinking of the word "plant", but such a schematic correlation is not only learned, but also not essential to plants as some cacti and lichen lack them. Essential components of species-specificity and immobility, on the other hand, are particular to templates. As noted earlier, schemas and their lexical markers are strictly learned whereas the information contained within templates are inferred and likely a result of the interaction between external stimuli and innate components. Schemas are ultimately flexible, whereas templates are quite rigid; we may manipulate the

information we have about virtually every object we encounter, yet the inferences within templates are inaccessible to manipulation, a quality akin to "modules" in the Fodorian sense (Fodor 2000: 63).[1] While we can create and compute concepts that violate these inferences, we cannot not use these inferences when interpreting the world. This relative rigidity also serves to differentiate schemas from templates.

The "dog" schema, for instance, must be remarkably flexible to incorporate "Black Labrador", "better than cats", "puppy", "Dachshund". The ANIMAL template and its constituent inferences do not change. Like schemas, the information in them may be violated, but unlike schemas, the information within them cannot be replaced. Transfers and breaches trip default inferences associated with an object, not change them. The salience of "a dog that transforms into a human" is derived by its violation of expectations, not the replacement; dogs with transformative abilities become neither the normal understanding of dogs nor animals in general.

What may be called "ontological level" (Keil, 1989: 214) or in the present case "template-level violations" are violations of the inferences contained within these templates (breaches and transfers), whereas "schema-level violations" are violations of the relationships between information related to and including entities which belong in these ontological categories (e.g., "a polka-dotted rose"). Barrett (2008) uses the term "counterschematic" to describe violations which are "individually and culturally variable" and "counterintuitive" as a description of a violation of "normal human [cognitive] development". Such a distinction is maintained here with particular emphasis on the mechanisms being violated. Whereas Bartlett was more concerned with how individuals will reconstruct novel narratives with already-learned information (schemas), current research has primarily two foci: template-level ontological violations (Boyer & Ramble, 2001) and the degree to which statements are counterintuitive (Atran & Norenzayan, 2004; Barrett 1997, 2008). The present approach focuses on which level of cognitive processing the violation occurs rather than when or to what degree it is counterintuitive or -schematic. Different types of violations, according to Sperber's (1996) predictions, ought to have differential retention rates.

Evidence suggests that template-level violations (Boyer & Ramble, 2001) and humorous (i.e., schema-level violations; see below) statements (Kaplan & Pascoe, 1977; Schmidt, 1994) are recorded in the memory significantly better

[1] While Atran (2002: 98) calls templates "modules", I suspect that modules, in the strictest sense would be the mechanisms responsible for the development and persistence of the inferences that inform templates and not the templates themselves (Purzycki, 2006b). Such a discussion lies beyond the scope of the present study.

than intuitive statements. Elsewhere, intuitive ideas are immediately recalled better than MCIs, but after a 1-week follow-up, MCIs are recalled significantly better than intuitive ideas (Norenzayan et al., 2006). There is an enormous literature demonstrating that recall of arousing information is significantly better than non-emotional statements (Christianson, 1992; Reisberg & Hertel, 2004). The inevitable question arises, however: Are affective concepts which consist of template-level violations *and* schema-level violations recalled significantly better than other types of representations? Humor represents a compelling case for MCI theory as it is – by definition – counter-intuitive, triggers a particular emotional response and shows signs of improved retention.

Humor as Counter-intuitive

The Incongruity Hypothesis (Deckers & Kizer, 1975) of humor has been reiterated with various permutations over the past few centuries (Roeckelein, 2002). Kant (1928 [1790]: 203), for instance, notes that humor "belongs to originality of mind… *Humour*, in a good sense, means the talent for being able to put oneself at will into a certain frame of mind in which everything is estimated on lines that go quite off the beaten track, (a topsy-turvy view of things) and yet on lines that follow certain principles, rational in the case of such a mental temperament". Koestler (1967: 91) characterizes humor as a "bisociative shock" – the surprising clash of the novel and the extant. Miller (2000: 415) argues that the comedic experience is about demonstrating how things "can go wrong" by "violating expectations". Humor is conceived as essentially surprising, counter-intuitive, and novel in non-Western traditions as well (Purzycki, 2006a). Whether it is the punch-line of a joke or a sudden eye poke (Three Stooges), humor necessarily has an element of counter-intuitiveness. While previous studies have ignored the role of emotion in the retention of mythical concepts, the present study tests the idea that humorous, schematic and template-level violations ought to be retained significantly better than intuitive statements.

Purzycki (2010) found that among four types of statements varying in counterintuitiveness – intuitive, statements with schema-level violations, template-level violations, and statements with both – the best candidates to elicit humor consist of violations of shared, schematic relationships and statements with only template-level violations, by and large, do not elicit high humor ratings. Template-level violations, however, were rated significantly more humorous than intuitive statements. Interestingly, statements with parallel violations (both schematic and template-level) had just as high ratings of

humor as those with only schematic violations. Drawing from these results, the present study asks the question of how these types of violations affect retention.

Experiment

Variables

Humorous ontological violations (HV) are statements that are counterintuitive at both the schema-level and the template-level; they consist of parallel violations which trigger an emotional response. For instance, assuming an individual were to judge "a daffodil that considered buying humans for his wife" as a funny concept, it would be an HV by virtue of the fact that objects that belong in the PLANT domain do not have agency, but also reverses the relationship between humans and plants; a schematic relationship. Humorous representations (HR) are humorous statements which are possible in real life, but most importantly do not breach or transfer a template-level inference (e.g., "a goose that drinks cheap whiskey". Template violations (TV) consist of violations of the default inferences of domains. For instance, "a living lizard" (ANIMAL) "made of stone" is a template-based violation. Intuitive representations (IR) consist solely of examples of animals and plants "behaving" in a manner that is expected of each already-known organism (e.g., a flower that grows). IRs should not be recalled as frequently as either HRs or TVs. While template-based counterintuitive representations are more memorable than intuitive statements, ideas that also trigger an emotional response with a violation of extant schemas in the form of humor should be retained better still.

Research which has focused on the degree to which ideas are intuitive/counterintuitive has shown that when subjects are exposed to intuitive (e.g., "closing door"), "minimally counterintuitive" (e.g., "closing cat"), and "maximally counterintuitive" (e.g., "squinting wilting brick") ideas, intuitive ideas are recalled at a higher rate than any of the counterintuitive ideas suggesting that there are limits of retention and counterintuitiveness (Atran & Norenzayan 2004; Norenzayan et al. 2006). Many of the statements that Atran and Norenzayan (2004) constructed contain schema and template-level violations (statements such as "giggling seaweed" might have been recalled because it is humorous and, indeed, would fall under my HV rubric). In other words, virtually incomprehensible representations (or objects with more than one misattributed quality/behavior) are not "catchier" – only statements that have a single violation are catchier. Norenzayan and Atran (2004) suggest that an idea such as "a giant gorilla in an opera house" constitutes a "bizarre" state-

ment, although according to my hypothesis, such an idea would be more memorable because it is a humorous statement.

HRs and IRs are plausible whereas TVs and HVs are not. However, TVs and HVs would not constitute Norenzayan et al.'s (2006) "bizarre" statements as they do not have extremely distant ontological and schematic applications. For example, "squinting brick" may presuppose that a block of baked clay has eyes. Eyes are appropriate to animals, but are not default inferences associated with any template. Rather, they are schematic features of the animals with which we are familiar. "Squinting" is particular to our schema of eyes. As such, Norenzayan et al.'s "bizarre" statements contain schematically distant associations resulting in a number of violations, least of which are at the template-level. Barrett and Nyhof's (2001) use of the term "bizarre" is slightly different from that used in Norenzayan et al.'s study. Moreover, Barrett and Nyhof's bizarre statements (e.g., "an object that is difficult to see under normal lighting conditions even with the aid of a microscope") were recalled better than intuitive statements. Most humorous statements exploit a particular schematic aspect of what participants should know about the particular animal. Coyotes howl, donkeys kick, and horses eat hay, but extending these facts by attaching a novel association (e.g., like giggling schoolgirls, below the belt, and hay-flavored jellybeans, respectively) comprises a statement's humorous quality. The novelty of the association is typically true: frogs *do* sound like belching, but eructing is humorous and the comparison to the croaking of a frog and that of human eructation is what defines such statements' humor. This does not constitute a TV, however, because it is an analogy and the domain is not violated. Put differently, "a frog that sounds like a creaking door" is not humorous because the comparison is probably too accurate and "creaking doors" are simply not very funny by virtue of their frequency and schematic intuitiveness. Pre-testing was necessary to ensure that the sample actually found statements humorous.

Methods

Pre-testing

All HRs and HVs were designed to be humorous, pretesting was conducted in order to weed out ideas which were not as judged by the target population (college students). I predicted that the humorous statements would be rated as significantly more humorous than TVs and IRs by virtue of their schema-level violations, TVs will be rated as significantly funnier than IRs by virtue of the fact that they are violations: HV=HR>TV>IR (for further analyses, see Purzycki, 2010). The initial phase of the study required a list of statements

that contain template-based violations, non-template based violations (humorous), and intuitive statements. Informants were approached in various locations around the campus of the University of Nebraska-Lincoln and asked to take part in a study about humor and memory. Students were not compensated in any fashion. A prerecorded list of statements (10 each) that fit into the four categories (HV, HR, TV, IR) was played to participants (n=49, male=26, age M=24.37, SD=3.56).

Subjects listened to treatments rather than read them as previous studies required (Barrett, 1997; Boyer & Ramble, 2001; Norenzayan et al., 2006). Exposing the transmission of such ideas to the reconstructive, organic nature of memory maximizes a study's "real-life" quality. A number of playlists (n=13) were constructed in the following pattern: Introduction, IR, HV, TV, HR, IR, HV, etc., randomly assigning appropriate statements using a shuffle feature on a portable mp3 player and manually arranging the files onto a playlist. The introduction (adapted from Barrett, 1997) was as follows:

> Dr. Jones was invited to the planet Mars to be the first Earthling to see the Grand Opening of the Martian Zoo Museum of Earth's Life-forms. As he walked through the hallways of the Martian Zoo, he noticed that each exhibit was labeled according to the animal or plant on display. The following are what he saw.

Informants were asked to judge how humorous they thought statements were on a 7-point Likert Scale (1=not funny at all, 7=very funny). Participants recorded their numerical judgments on a sheet of paper as they listened to the narrative.

Results

There were no significant differences between the ratings of humor of HVs (n=10, M=3.95, SD=1.15) and HRs (n=10, M=3.76, SD=1.14). However, TVs (n=10, M=2.60, SD=0.97) were rated significantly higher than IRs (n=10, M=1.52, SD=0.85), ($F_{3,\ 48}$=58.14, P<0.01). Post-hoc Tukey's and Scheffé's (alpha level=0.01) tests were conducted for each category in order to test the overall hypothesis that there would be statistically significant differences between degree of humor for each variable showing that indeed, HV=HR (Tukey's P=0.81; Scheffé's P=0.85) and HR>TV>IR (P<0.01 for each test).

The fact that there is no significant difference between the means of both humorous variables is not surprising. However, the fact that there is a significant difference between the TVs and IRs suggests that subjects in studies primarily concerned with TVs (both breaches and transfers) may conflate some TVs with humorous statements. This, again, is not surprising, as I predicted

that there would be a significant difference as TVs are indeed violations. Note, too, that TVs were rated as more humorous than IRs, but significantly less humorous than HVs and HRs. The purpose of pretesting was to obtain the most humorous statements within the HV and HR categories and the least humorous of the TVs and HRs.

Experiment

Once the composite scores for the sample's judgment of humor were tallied, four final categories with six respective representations were selected: (a) *least* humorous intuitive representations (IR), (b) *least* humorous template-based violations (TV), and (c) *most* humorous representations (HR) and (d) *most* humorous template-based violations (HV). As requiring subjects to read statements allows multiple exposures to particular ideas, selected items (Appendix A) were organized into a narrative (in the format of Introduction, IR, HV, TV, HR, IR, HV, TV, HR… etc.), recorded onto a portable mp3 player, and played to a different sample of individuals (n=32, male=14; age M=21.44; SD=3.11). Participants were recruited from various locations on the campus of the University of Nebraska-Lincoln and asked to participate in a study about memory. Upon acceptance, participants were requested to return one week later. After reading and signing consent forms which discussed the general aims of the study (including humor, memory and myth), subjects were told they would listen to a recording, complete an undefined task, and then answer a few questions.

This was a 2 (humorous *vs*. non-humorous)×2 ANOVA design (template-based violation *vs*. non-template based violation). In order to control for order effects, a number of playlists of the items (n=15) were constructed with random assignments of specific statements, but maintaining the above-noted pattern. One recording out of the 15 was randomly selected and played to each participant. After the narrative finished playing, participants were asked to complete a number of arithmetical problems as a distraction task lasting 5 min. Once the distraction task was completed, subjects were asked: "What did Dr. Jones see in the Zoo Museum"?

Two additional independent coders who were not familiar with the study or the literature coded the data as successfully or unsuccessfully recalled using the rules provided (Appendix B). The following results were produced with items that *at* least two of the coders agreed were correctly recalled. Inter-rater reliability was measured using Cronbach's alpha generating high correlations of 0.94 for the first round of recall and 0.88 for the follow-up.

Results

HVs dominated recall (M=1.94, SD=0.91), whereas HRs (M=1.16, SD=0.72), TVs (M=1.13, SD=1.34), and IRs (M=1.25, SD=0.80) were recalled, on average, equally. A 2 (humor)×2 (template violation) within subjects ANOVA showed a significant interaction effect for humor and template violations, $F_{1, 31}$=10.09, P<0.01, insignificant effects for humor, $F_{1, 31}$=3.93, P=0.06, as well as template-based violations, $F_{1, 31}$=3.91, P=0.06, partial. Independent t-tests were conducted to test the overarching hypothesis that recall rates would be as follows: HV>HR>TV>IR. Considering the fact that HVs were pulling the bulk of the statistical weight, each variable was then treated independently (two-tailed t-tests). HVs were recalled significantly greater than all other variables: HRs (t=3.79, P<0.001), TVs (t=2.84, P=0.01), and IRs (t=3.20, P<0.01). Initial recall rates are far superior for HVs. The general hypothesis that humorous ontological violations are recalled better is clearly supported.

During a follow-up study conducted one week later, participants were once again asked "What did Dr. Jones see in the Zoo Museum?" (n=31; one male individual did not return for the follow-up). I predicted that the patterns in which representations are recalled would be HV>HR>TV>IR. Once again, HVs (M=1.32, SD=1.01) were recalled significantly more than TVs (M=0.71, SD=0.82), IRs (M=0.68, SD=0.98) and HRs (M=0.58, SD=0.62). A within-subjects 2 (humor)×2 (template violation) ANOVA reveals, again, that there are significant interaction effects $F_{1, 30}$=6.85, P=0.01 partial and insignificant effects of humor $F_{1, 30}$=3.27, P=0.08. Consistent with Norenzayan et al.'s results (2006), template-level violations had a significant effect on recall rates on the follow-up trial, $F_{1, 30}$=6.23, P=0.02. Again, however, HVs are pulling most of the statistical weight. A round of independent t-tests (two-tailed) was conducted in order to examine the difference between each category of the follow-up indicating that HVs are recalled significantly more frequently than all other ideas: HRs (t=3.48, P=0.001), TVs (t=2.61, P=0.01), as well as IRs (t=2.55, P=0.01). Recall of TVs, HRs, and IRs are not significantly different from each other.

Discussion and Conclusion

In this study, HVs were recalled significantly better than all other types of statements. Contrary to previous research (Boyer & Ramble, 2001), TVs are not recalled significantly better than IRs. Rather, the analyses show that the concepts which contain template-level as well as schema-level violations which stimulate an emotional response will be retained better than other types of

statements. This may be a distinctiveness effect (McDaniel & Einstein, 1986) insofar as TVs and HRs lose their salience when nested within a list that contains HVs. On the other hand, Norenzayan et al. (2006) demonstrate that upon initial recall, minimally counterintuitive statements are not retained better than intuitive statements, and after time, intuitive statements decay at a significantly faster rate than minimally counterintuitive ideas. Template violations did show significant effects on recall for the follow-up.

These findings help to explain the prevalence of emotion-triggering schema- and template-level violations, particularly in religious narratives. The broader implications of the role of emotion in transmission and retention of mythological and other religious ideas should be obvious. However, utilizing various emotions may affect results insofar that they simply be more important to remember if sanctions against particular ideas are evident within a social context. Moreover, given the strong interaction effect, schematic and template-level violations alone should not be recalled better on their own, but rather when two parallel violations occur, retention is maximized. Future researchers may wish to control for emotion *via* pretesting, rather than assume they are or are not playing an active role in the retention of ideas which might otherwise be conceived as cold computations. One potential route, particularly for humor researchers, would be to conduct longitudinal studies to see if the decay of humor ratings is systematic between HVs and HRs. One might predict a correlation of slower decay rates of humor and retention over multiple exposures to the same ideas.

Methodologically, these and others' results may be internally valid and context-specific; in the present case, controlling and concern for affective responses likely resulted in insignificant recall rates for TVs which would otherwise be retained better than intuitive statements. Moreover, delineating schema and template-level violations should be considered in future research. Even though, for instance, "purple dog" might be by definition minimally counterintuitive, it is novel by virtue of our schemas and conceptual prototypes of dogs, not because of any deeper, ontological violation. Delineating between types of violations based on appropriate models should serve to facilitate further inquiry which is both theoretically rich and empirically productive. Controlling for humor and affect in general in MCI research may be necessary to ensure confounding influences are absent.

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Appendix A: Experimental Statements

Humorous Template-Violations (HV)

1. a chicken that transforms into a dumpling
2. an oak tree that likes to urinate on dogs
3. a rabbit that has taken a vow of chastity
4. a raccoon that cusses like a sailor
5. a sheep that demands its wool back
6. a willow that likes to trip people

Humorous Representations (HR)

7. a coyote that sounds like a giggling schoolgirl
8. a dog that whines when told to get a job
9. a donkey that kicks below the belt
10. a goat that passes out when nervous
11. a goose that drinks really cheap whiskey
12. a hamster that head-butts little kids

Template Violations (TV)

13. a bear that can only be seen during a full moon
14. a crow that turns into a statue
15. a goldfish that can completely disappear
16. a living lizard made of stone
17. a tulip that listens to people
18. a worm that turns into a bird

Intuitive Representations (IR)

19. a bee that makes a hive
20. a cow that eats grass
21. a puppy that requires milk from its mother
22. a Robin that sings pretty songs
23. a rosebush that grows slowly
24. a weed that grows quickly

Appendix B: Coding Rules

Two coders other than I were provided the following rules for inclusion along with the raw data. They were asked to mark which statements were correctly recalled according to the rules provided. Below are the rules with examples from the actual data set to illustrate how these rules were employed. Examples were not given to coders. When a statement is granted "1 pt", the statement is recorded as having been successfully recalled; "0 pt" marks are not counted as recalled.

Rule 1: If a recalled statement contains an error of the object and the replaced object is of the same degree of specificity (e.g., genericizing a particular folk-species) and of the same template, then the recollection is counted. However, if one recollection is composed of an object being replaced that is beyond one degree of (conceptual) similarity, then the recollection is not included.

Ex.: Willow tree (oak tree) that (likes to) urinates on dogs. (1 pt.)
Ex.: Gerbil (hamster) that head-butts little kids. (1 pt.)
Ex.: Goat (hamster) that head-butts little kids. (0 pt.)
Ex.: Something (oaktree) that liked to pee (urinate) on dogs. (0 pt.)

Rule 2: If a recalled statement contains an error of the action or description and the replaced action or description can be considered related, then the recollection is counted. However, if an object or an object's actions or description are replaced with a generic response, no part of the statement is counted.

Ex.: A hamster that chases (head-butts) little kids. (1 pt.)
Ex.: A sheep that wanted (demanded) its wool back. (1 pt.)
Ex.: A bear that is invisible (can only be seen) during a full moon. (1 pt.)
Ex.: A tulip that did something (listens to people). (0 pt.)

Rule 3: If a recalled statement contained the correct subject and correct verb, but does not contain a particular detail which does not compromise the relationship between the subject and its immediate predicate, then the representation is considered successfully recalled.

Ex.: A puppy that needs (requires) milk (from its mother). (1 pt.)
Ex.: A donkey that kicked people (below the belt). (1 pt.)
Ex.: A tulip that listens (to people). (1 pt.)

Rule 4: If a statement in its original form contains an analogy and the analog of the subject is made generic, the recollection is not counted.

Ex.: A coyote that laughs or something (like a giggling schoolgirl). (0 pt.)

Rule 5: If a statement of one category (e.g., HV) is recalled in such a way that it becomes part of another category (e.g., HR), then the statement is not included unless the recollection still can be interpreted as meaning the same thing.

Ex.: A willow that (liked to) tripped people. (1 pt.)
Ex.: A donkey that gets kicked (kicks) below the belt. (0 pt.)

Regarding the problems inherent coding data collected in such studies, Atran and Norenzayan (2004), state one example from their study which counted the recollection of "laughing horse" whereas the original was "cursing horse". As an HV, this would count as successfully recalled according to my rules (see Rule 2), albeit a stretch as "cursing" and "laughing" are quite different "verbal" behaviors. However, there is no discussion of making objects of statements generic (Rule 4) or cross-variable distortions (Rule 5).