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The Contagion Concept in Adult Thinking in the United States: Transmission of Germs and of Interpersonal Influence

CAROL NEMEROFF and PAUL ROZIN

CONTAGION

The “magical law of contagion,” one of the laws of sympathetic magic, was introduced by anthropologists about 100 years ago (Frazer 1959[1890]; Mauss 1972[1902]; Tylor 1974[1871]). The laws of sympathetic magic were originally presented as consistent principles underlying magical beliefs and practices widespread in traditional cultures and were believed by Tylor, Frazer, and Mauss to be basic and universal principles of thinking. Their ideas are presented, critiqued, and developed particularly well in recent work by Tambiah (1990). We have been investigating the operation of the magical laws in the thinking of American adults over the last several years (e.g., Nemeroff and Rozin 1989, 1992; Rozin et al. 1986; Rozin et al. 1989; and see Rozin and Nemeroff 1990, for a review).

The “law of contagion” holds that people, objects, and so forth, that come into contact with each other may influence each other through the transfer of some or all of their properties. The influence continues after the physical contact has ended and may be permanent (Frazer 1959[1890]). According to Mauss, “once in contact, always in contact.” An example comes from the Hua of New Guinea, who believe that a person’s “vital essence” resides in worn garments, products of his garden in which he has invested effort, and children he has helped to create and to nourish (Meigs 1984), while the Kai of northern New Guinea reportedly believed that “everything with which a man comes in contact retains something of his soul-stuff” (Frazer 1959[1890]:68). The underlying assumption in magical contagion, either explicitly or implicitly, seems to be that, through contact, some “essence” or “soul stuff,” some as yet undefined contagious entity, may be transmitted. The transfer of properties or influence is accomplished through this “stuff.”

A large number of societies have “models” that describe or account for contagious magical effects in terms of such a construct. One of these is “mana,” originally described by Codrington (1891) among the native inhabitants of Melanesia. Mana is described as

that invisible power which is believed by the natives to cause all such effects as transcend the regular course of nature, and to reside in spiritual beings, whether in the spiritual part of living men or in the ghosts of the dead, being imparted by them to their names and to various things that belong to them. . . . [A person] can be said to have mana . . . the word being used as a substantive. [1891:191]

Mauss, analyzing Codrington’s examples of mana, describes it as “the genuine effectiveness of things . . . what causes the net to bring in a good catch . . . and keeps the canoe sailing smoothly. In the farms it is fertility; on an arrow it is the substance which kills” (1972[1902]:111). Underhill (1965) describes very similar concepts among various Native American groups, each concept having a slightly different meaning but being clearly similar to the mana notion. The Iroquois and Dakota speak of “orenda,” and the Osage had the notion of “wakan,” while Mauss (1972[1902]) noted that the Algonquins and Ojibway shared the notion of “manitou,” and the people of Madagascar referred to “hasina.” Mauss theorized that this widespread concept is simultaneously considered as both a force and a material substance that can be localized; it is also spiritual—a sort of conglomerate power or force, soul, and sub-

stance in one. It is the essential nature, the influence, the potency of things in purest form.

ORIGINS OF THE CONTAGION CONCEPT

Magical contagion might simply be an inevitable result of human development. A principle like “contact causes influence” might be learned from very early experiences, beginning with the infant’s perception that his own grasping, pulling, pushing, and so on have influence on objects, causing movement. Piaget (1974) makes just such an argument in his discussion of the origins of certain principles of causal reasoning in the child, undoubtedly based in the Humean account of the origins of causal principles—namely, that they are abstractions based on repeated experiences in the world. Unfortunately, the predictions of such accounts for how causal reasoning/perception should develop in children are not very well borne out in the experimental literature (see, for example, Bullock et al. 1982). A more successful approach has been the Kantian “generative” approach, which assumes that the mind imposes its organization on the world, rather than the converse. What is imposed in causal reasoning in general is, first, the assumption that events *have* causes and, second, the tendency to think in terms of, or search for, a causal mechanism. It may be that “transmission of influence via contact” is also imposed on the world, as an “intuitive” or “prepared” concept helping to define plausible mechanisms.

This view is not at all new. Lévi-Strauss (1968[1950]) agreed with Mauss that, despite the multiplicity of mana concepts, they seemed to represent explanations of the same type. He suggested that they are so frequent and widespread as to suggest a permanent, universal form of thought that is a function of the mind in the face of certain events or situations and, thus, likely to appear each time the situation occurs. Such a statement comes very close to the Jungian concept of archetypes, “primordial images” in a collective unconscious that are “deposits of the constantly repeated experiences of humanity. . . . [The] thoughts of men shape themselves upon these primordial images as upon a blueprint” (Jung 1983[1917]:68). (In fact, Jung explicitly discussed mana, describing it as an energy- or power-concept encompassing the idea of soul, spirit, God, health, bodily strength, fertility, magic, influence, power, prestige, medicine, as well as certain states of feelings that are characterized by the release of affects.) The thesis guiding this

investigation is that lay conceptions of, and feelings about, contagion are based in a primitive, generalized concept that may form the basis for, but is much broader than, biomedical germ theory. By “primitive” we mean something akin to Shweder’s (1977) notion of “intuitive concepts,” concepts that are very easily acquired even under highly degraded learning conditions—similar to Seligman’s notion of “preparedness” (Seligman 1970). In contrast, nonintuitive concepts (such as contingency) are difficult to acquire under even ideal learning conditions.

FUNCTIONS OF CONTAGION BELIEFS

A biological view of the adaptive value of contagion is that it originates as a defense against microbial contamination. This view points to a clearly adaptive value of contagion beliefs and readily accounts for the negative bias in contagion. However, such a view does not readily account for the consequences of contagion beliefs to humans, nor the great extension of such beliefs to situations in which microbial contagion plays no part (e.g., positive contagion, rejection of entities cooked or washed in the period between contact with an undesirable entity and contact with a person). Gaster, in his 1959 edition of Frazer’s *The Golden Bough*, focused on the “self” aspect of mana, explicitly suggesting that the concern underlying the law of contagion is the “primitive notion” of the extended self and the interaction of this self with other selves. He calls it an oversimplification to say, as Frazer did, “that one can use a man’s garment in magic because of some property attaching to it materially because, having once been in contact with him, it can ever-afterwards ‘influence’ him. The truth is rather that the garment is itself a part of him” (Frazer 1959[1890]:176). Mary Douglas (1966) focused more on the dialectical aspect of pollution, claiming that institutionalized pollution rules, especially those concerning sexual taboos, tend to reflect either a society’s internal stress points or its points of vulnerability to external forces. For example, Douglas sees rituals that express anxiety about the orifices of the body as a reflection of concern about the integrity of the group in question: “the Israelites were always in their history a hard-pressed minority. In their beliefs all the bodily issues were polluting, blood, pus, excreta, semen, etc. The threatened boundaries of the body politic would be well mirrored in their care for the integrity, unity and purity of the physical body” (1966:124). She claims the same

holds for Hindu India if one considers each caste as a type of minority group with higher castes having more to protect (and hence more pollution concerns) than lower ones. The lowest caste, the “untouchables,” are literally that, since being inferior to all other classes, contact between them and anyone of a higher caste results in defilement of that person (see, for example, Stevenson 1954).

The issue of relative superiority/inferiority interacts with the issue of the extended self in intriguing ways. Examining the notion of “kinship” quickly reveals that kin are literally thought of as “being of the same stuff” (Schneider 1980). The texts of the American Jim Crow laws and the legal system of Apartheid in South Africa are replete with references to contagion. In particular, reactions to interracial sexual or marital relationships and offspring are seen as involving the mixing of unlike essences (the concern, of course, being primarily the pollution of the white essence, held to be superior). Appadurai (1981) and Stevenson (1954) point out that in most social structures, should purity overcome pollution, the social system would break down. If contact between a Brahmin and an untouchable elevated the latter rather than pollute the former, soon everyone would be Brahmins, and meaningful distinctions could no longer be made. Consequently, the power relations inherent in the social system would collapse, and the existing hegemony would be lost. Biological imperatives can dictate exceptions to the model of pollution overcoming purity. An example is the case of British Royalty, where the offspring of endorsed Royal-non-Royal unions are considered Royal.

The concept of “self” implies “not-self,” a critical element to the understanding of contagion. The boundaries between self and not-self are fuzzy. A concept that captures this fuzziness, “distance from self,” may be particularly useful in examining the superiority/inferiority dimension. In general, contact with something that is too “distant from self” (biologically or socially defined, discrete or extended) is usually dangerous or harmful, almost of logical necessity: contact lets things that are “outside” get “inside.” The incorporation or invasion of something totally alien into the self threatens the organization and integrity of the self (the risk is of the self being crippled, disintegrating into chaos, or worse yet, being taken over by the alien organization). This is why overly close

contact with deities may be deadly, even though they are clearly superior and positively valenced.

Durkheim's (1965[1915]) views on the relation of the "mana-feeling" and "mana-concept" to the origin of religion elucidate a different aspect of the social basis and functions of mana. He claimed, in essence, that people become conscious of the "mana feeling" during group activities that are dramatic, emotional. They symbolize their feelings with objects that become viewed as sacred, the sense of the sacred involving the perception of the transcendent nature of society. Eventually, rites and beliefs are organized around these objects, giving rise to religion. To borrow O'Keefe's words, "the organization of these objects falls into place as a classification system that is a cosmological map projecting social morphology onto nature like a magic lantern." The mana affect, then, is a "half-cognitive experience that mediates man's recognition of society" (O'Keefe 1967[1982]:187-189).

PRIOR EVIDENCE OF CONTAGION BELIEFS IN THE UNITED STATES

The nature of the contagious entity is largely unarticulated in the United States, except for the subset of contagion-relevant cases covered by the biomedical germ theory (and lay variations on this). Nevertheless, there are numerous examples in daily life suggestive of an implicit model of interpersonal (nongerm) contagion. Rozin et al. (1986) demonstrated multiple behaviors consistent with contagion beliefs in disgust, food-related, and interpersonal domains, primarily among American college students. For example, people avoided a drink if it had even briefly contacted a sterilized cockroach, and they considered shirts previously worn by a disliked person to be less desirable than those worn by liked or neutral persons. Rozin et al. (1989) systematically explored the dimensions of contagion (positive/negative, direct/indirect, etc.) in the interpersonal domain via questionnaire, finding evidence in the reactions of all 140 American subjects for magical contagion-type thinking, primarily in terms of negativity to contact with clothing worn by, food bitten by, or personal effects of, unsavory or personally disliked people.¹ Nemeroff and Rozin (1989), and Stein and Nemeroff (in press) have found evidence for the operation of an implicit, unacknowledged belief in the magical maxim "you are what you eat" in its most concrete sense (that is, the transfer of concrete properties of foods eaten to the eater) among college

students. The “you are what you eat” principle can be considered a derivative of magical contagion in that properties of a source are conveyed to a recipient via ingestion, perhaps the most potent form of contact. In the domain of illness-cognition, Rozin et al. (1992) and Nemeroff et al. (1994) have identified the operation of magical contagion subprinciples (including “permanence” and “holographic nature” of effects) in lay reactions to AIDS.

GOALS OF THE CURRENT STUDY

The primary goal of the current study was to explore the central question posed by cases of interpersonal contagion documented in our previous work: what is the psychological nature of the contagious entity, or “essence,” in the United States? While our previous work had demonstrated numerous behaviors and feelings consistent with magical contagion beliefs, it had not yet directly explored the beliefs, whether explicit or implicit, underlying those behaviors and feelings. In particular, we wished to determine whether different types of source are felt to transmit different types of contagious entity (rather than there being a single, undifferentiated type of essence). Feelings about contagious contact were examined in-depth in a sample of native-born American adults, using “sources” representing “interpersonal” contagion, positive and negative, as well as physical illness and disgust. The nature of the contagious entity in each case was assessed through analysis of the types of actions that effectively canceled (purified) contagion effects from each source. The logic behind this approach was that, depending on specific conceptions of the nature of the entity, different purificatory actions should be differentially effective in terms of undoing contagious effects (feelings). For example, if Hitler’s sweater is to be avoided because of a germlike entity, avoidant feelings should be relatively unaffected by symbolic actions or by having Mother Teresa wear it. On the other hand, sterilizing or otherwise laundering it should prove helpful in alleviating negative responses. By looking at the rank order of efficacy of various potentially “purifying” actions, we hoped to infer the nature of the “stuff” thought to be transmitted in various contagious examples. Five models of contagion (described more fully below) were tested: a germ model, a residue model, an associative model, a symbolic interaction model, and a spiritual model.

METHOD

SUBJECTS

Thirty-six paid subjects from the Philadelphia area were recruited from (1) a preexisting subject pool consisting of University of Pennsylvania support staff and hospital employees; (2) acquaintance networks from the University of Pennsylvania, Temple University Hospital, and a racially mixed young urban professional neighborhood; and (3) notices posted on selected buildings in the Philadelphia area tenanted and maintained by a low socioeconomic status population. No more than one additional referral from a given subject was used. The objective of this method of recruitment was to obtain a range of subjects not limited to the university students who had formed the majority of our prior samples (we wanted a somewhat more representative sample of the general population in terms of range of ethnicity, age, and socioeconomic status).

Subjects were required to be at least 18 years of age, to have at least a tenth grade education (to ensure understanding of the rating scale used), to be currently involved in a heterosexual romantic relationship (since spouse/lover was one of the "contagious sources" used), and to be born in the United States. Subjects were initially contacted by telephone, screened for eligibility, and scheduled for the first session. Approximately half of those contacted agreed to participate. Two subjects dropped out between the first and second of the two interview sessions.

The age of the final sample population ranged from 20 to 67 years, with a mean of 34.7 years. Twenty-seven subjects were Caucasian and 9 were black; 17 were male (6 black, 11 white) and 19 were female (3 black, 16 white). Four subjects had a high school degree, 20 had some college or a bachelor's degree, and 12 had varying amounts of postgraduate education, including M.A.'s, M.D.'s, and Ph.D.'s. Thus, the sample was quite overeducated relative to the general population. Nine subjects identified their religious background/affiliation as Jewish, five as Protestant, five as Catholic, one as Moslem, one as Buddhist, two as "new age humanist," two as atheist, and twelve claimed no affiliation.

PROCEDURE

Overview. The data reported here were collected as part of approximately four to six hours of structured interviewing, divided into two sessions. In the first session, subjects identified a set of people who were emotionally significant to them (“sources”), and then imagined them contacting a previously neutral object, a sweater. They then rated their feelings about wearing that sweater, explained their ratings if they could, and answered open-ended questions about how to negate any emotional effects (“contagion”) of the source’s contact with the sweater. In the second session, they imagined each of a predetermined series of potentially purificatory actions being carried out on the sweater, rated their feelings about wearing (or where wearing was now impossible, holding) the sweater following each action, and explained why in open-ended fashion.

“Sources” of contagion. Eight “sources” of contagion were identified, chosen to represent two major dimensions of source-entity and contagious essence: (1) positive versus negative, and (2) moral/interpersonal versus physical illness contagion risk. Subjects chose five of the eight “sources” from their personal experience. For each of these, a category description was provided by the interviewer, and the subject selected the person who best exemplified that category in his or her own life. The remaining three sources were the same for all subjects, descriptions of them being provided by the experimenter. The sources were as follows (the first five being specifically identified by name by each subject): *Lover*: “Your husband/wife/ boyfriend/girlfriend,” as appropriate (positive, interpersonal). *Enemy*: “The person you dislike most in your personal life. . . . [A] personal acquaintance, whom you mistrust or just don’t like” (negative, interpersonal). *Evil*: “A person, preferably living, whom you consider to be evil, or to personify evil; not someone you know personally, but a villain—maybe a mass murderer, or a fanatical leader—you have strong feelings about” (negative, interpersonal). *Good*: “Another public figure, again preferably living, whom you consider to be ‘good’ or to personify goodness; maybe a religious figure or someone who does good works, or (etc.)” (positive, interpersonal). *Sexy*: “Your favorite sex-symbol; maybe a movie star or a rock star or an athlete or other public figure—the one you find sexiest” (positive, interpersonal).

Hepatitis: “A person whom you don’t know, who has infectious hepatitis, a fairly serious illness which is caused by a virus and which is sometimes fatal” (negative, illness). *AIDS*: “A person who has AIDS . . . not homosexual or a drug abuser; he contracted AIDS through a blood transfusion” (negative, illness). *Dogdoo*: “A small pile of dog feces” (negative illness/disgust). Sweaters “fell on” the dogdoo, rather than being “worn by” this source.

Rating scale. Ratings were given on a 200-point scale, running from -100 to +100, with -100 “the most unpleasant experience you can imagine in everyday life,” and +100 “the most pleasant experience you can imagine in everyday life.” Zero was neutral. Subjects familiarized themselves with the use of the scale, then gave their baseline rating for an attractive, new, never-been-contacted sweater, as follows: “Rate how you would feel about wearing a nice, soft, blue sweater, big and bulky, unisex in style. It was laundered a couple of days ago but it’s new, has never been owned or worn by anyone.” Identical sweaters were then described as having a history of contact with each of the contagious sources and, eventually, as undergoing the various purificatory actions.

Sweater contact scenarios and open-ended questions. In the first interview session, subjects were told to “imagine a nice soft blue sweater . . . looks just the same as the one you imagined before. Imagine it belongs to [source name]. It was laundered a couple of days ago and then s/he wore it for half an hour yesterday. I happen to have the sweater and I ask you to wear it. Assume the sweater fits you comfortably. Rate how you would feel about wearing this sweater—just around the house, no one will see you and [source name] won’t know” (to minimize social-presentational or interactional concerns). For dogdoo, the scenario was: “the sweater was accidentally dropped for a little while on a small pile of dogdoo. There is no obvious trace of the dogdoo on it, no stain and no smell, but it hasn’t been washed since.”

Any change from the baseline rating, even of a single point, was considered a “contagion” effect. Subjects showing such effects were then asked: “How could you undo the effect, make the sweater no better/worse than the new identical one?” This was followed by “How could you make it a stronger effect?” Then, contact scenario, sweater rating, and purification and intensification open-ended questions were repeated for the next source.

Sources were presented in a semirandom order: the order of the five interpersonal/moral sources (lover, good, sexy, enemy, evil) was randomized between subjects. However, hepatitis, AIDS, and dogdoo were always presented last and in that order, to avoid suggesting a convenient physical contagion or disgust model to subjects for the interpersonal sources.

Purification sequences. In the second session, subjects were asked to rate how they would feel about contacting each source's sweater after various actions had been carried out on it. Purificatory actions included were based on our distinguishing two broad classes of model: physical and nonphysical. Different purificatory actions were selected that should be differentially effective to undo contagion effects based on the different types of model. There were four classes of purificatory actions. *Physical cleaning* actions, which involved removing substances from the sweater, ranged from deodorizing to sterilizing by soaking in boiling water. *Structural change* actions, which involved changing the form of the sweater, ranged from putting a large gash in it with a scissors to burning it to ash. *Spiritual opposite-contact* actions involved having an opposite-valenced source wear the sweater following the initial contagious contact. And *recency* involved the length of time elapsed since the source was in contact with the sweater. A full list of the purificatory actions is presented in Table 1 (in conceptual order, not the order actually presented).²

Subjects were asked questions regarding purifications in the following format: "Imagine that I take the sweater worn by [source] and I sterilize it by soaking it in boiling water [or other purification]. Rate how you would feel about wearing [source]'s sweater, sterilized [or otherwise purified]." For opposite-contacts the format was: "Now imagine that after [source] wore his/her sweater yesterday, [opposite-valenced source] then wore it for half an hour. How would you feel about wearing it now?" Subjects rated the first source's sweater, purified in each way, then went on to do the same for the second source's sweater, and so on.³ Subjects kept track of their ratings on structured sheets, which allowed easy referral to previous ratings. The format of keeping all previous ratings easily accessible to subjects, and allowing them to change ratings occasionally if they so desired, was used to minimize confusion and

TABLE 1
ACTIONS INCLUDED IN STRUCTURED PURIFICATION SEQUENCE

Substance: clean

- Deodorize—neutral smelling deodorizer
- Sun/air—hang on clothesline for two hours
- Water—rinse in warm water, no soap
- Detergent—wash with warm water and regular detergent
- Boil—sterilize by soaking in boiling water

Structure: destroy or deface

- Reknit—unravel and reknit into a scarf
- Gash—put a large gash in with scissors
- Unravel—unravel into a pile of yarn
- Cut up—cut up into pieces one inch square
- Burn—burn to ash

Interpersonal: opposite-contact

- For positive sources—after source wears sweater for 1/2 hour, a negative source wears it for 1/2 hour (five total opposite contacts, one for each negative source: enemy, evil, hepatitis, AIDS, dogdoo)
- For negative sources—a positive source wears it (three total: lover, good, sexy)

Time: recency

- One year elapsed since source wore sweater (not laundered in interim)
-
-

error variance due to memory limitations, hopefully increasing the accuracy of the emergent picture of their conceptual structure.

RESULTS

CONTAGION: BASIC EFFECTS OF CONTACT WITH SOURCES

Table 2 shows the mean difference scores for the new sweater versus the source's worn sweater, and standard deviations, for each source. T-tests were done on the difference scores to see if contagion effects differed significantly from zero, using Bonferroni's correction for multiple tests. Significant effects are indicated in Table 2.

These results regarding the basic contagion effects are consistent with our previous findings. The vast majority of subjects showed substantial negative responses to contact with objects having a history of contact with negative sources (where there was never any actual risk of germ transmission). In contrast, the mean effects for positive sources were very small. It is important to note that these

TABLE 2
SOURCE'S WORN SWEATER MINUS NEW SWEATER RATING: MEAN DIFFERENCE SCORES

Source	Mean	SD	Significance
Lover	4.26	23.66	NS
Good	3.03	27.82	NS
Sexy	10.14	34.99	NS
Enemy	-50.81	37.55	.001
Evil	-66.17	41.38	.001
Hepatitis	-57.06	42.96	.001
AIDS	-48.08	41.73	.001
Dogdoo	-60.97	49.94	.001

small effects did *not* reflect uniform indifference to positively “contaged” sweaters. Rather, there was a high degree of variability in direction of effects for positive sources, with some subjects showing substantial enhancements, some showing negative effects, and some showing no effects at all. Across the three positive sources, 38 percent of subjects showed a positive effect of at least ten points; 39 percent showed minimal or no effects; and 25 percent showed drops in sweater ratings of ten points or more (negative effect).

RELATIONS BETWEEN RESPONSE PATTERNS TO PURIFICATIONS FOR THE DIFFERENT SOURCES

In order to determine the degree to which the contagious entity from one source behaved similarly to contagion from other sources, we performed Pearson correlations on response patterns for purifications applied to each source. That is, the pattern formed by the mean scores for a source’s sweater, purified in each of the various ways, was correlated with the pattern for every other sources’ sweater. For negative sources, all subjects’ data were included in analyses. For positive sources, however, since we wanted to understand the nature(s) of positive contagious entities for those who seem to “believe” in them, our analyses focused only on the subset of subjects who rated the sweater more highly following its contact with positive sources. Furthermore, to circumvent the problem of there being insufficient room for scores to change in a clear pattern on the purification sequences, we examined only

those subjects showing positive effects of ten points or more for the source in question. There were 13, 11, and 17 subjects analyzed for lover, good, and sexy sources, respectively.

Finally, since the "interpersonal opposite-contact" purification category necessarily involved different source people specified as the "opposites," depending on the source being examined, these items were not included in correlations carried out between positive sources and negative sources. They *were* included for correlations *within* source valence (positive/negative), in order to use as much information as was available for any given case.

The three positive sources predictably showed extremely high intercorrelations with each other (range .92 to .96), while intercorrelations among negative sources fell into two groups. Enemy and evil were very similar to each other ($r = .89$) as were hepatitis, AIDS, and dogdoo with each other (r 's were .89 or .90). The only significant correlation between sources that *crossed* this apparent moral-physical boundary was substantially lower, occurring between evil and hepatitis ($r = .41$).

Relations between positive and negative sources are complex. Positive sources (all of which represent interpersonal contagion) are strongly negatively correlated with negative interpersonal sources, enemy and evil (r 's ranging from -.66 to -.83). A high negative correlation means that the same purifications have neutralizing effects (making the sweater less good [more neutral] for positive sources and more good [again, more neutral] for negative sources.) These negative correlations thus indicate substantial symmetry between interpersonal positive and interpersonal negative sources. In contrast, positive sources show essentially *no* correlations with hepatitis (r 's ranging from .02 to -.15) and weak to moderate positive correlations with dogdoo and AIDS (r 's ranging from .10 to .43). By this analysis, the positive interpersonal sources form a highly related cluster; the negative interpersonals form another cluster that is almost the inverse of the positive; and the three "physical" sources form a third cluster, different from the interpersonals.

MODEL TESTS

Derivation of models of contagion. Having confirmed a basic distinction in the nature of the contagious entity for physical versus

interpersonal-moral contagion, we wished to discern more specifically the nature (or natures) of both physical and nonphysical contagious entities. We identified five relatively specific (sub) models: two physical and three nonphysical. The two physical models were: a *germ model*, defined as contagion being carried by a living invisible entity, a micro-organism or germ, and a *residue (or physical trace) model*, defined as contagion effects being dependent on sensible, perceptible residues, such as odor, dandruff, body heat, and so forth. The three nonphysical models were: a *symbolic interaction model*, defined as the meaning or statement implied by one's interaction with the object being the important issue in contagion (for example, wearing Hitler's sweater would be negative because it implies approval or acceptance of him and his actions, or a desire for closeness or sharing with him);⁴ a *spiritual essence model*, defined as some nonmaterial essence of the source being embodied in the object (for example, the Pope's soul-stuff or personal energy, "vibes," being contained in a sweater he has worn—corresponding to the contagious entity cited in some ethnographies, such as the *nu* of the Hua of New Guinea; see Meigs 1984); and finally, an *associative model*, defined as contagion being based in the reminding value of the object, such that the contaged item serves as a pleasant or unpleasant reminder of the source. Clearly, the efficacy of various purifications relative to certain others should be quite different depending on the exact version of physical or nonphysical model used.

To determine the predictions of each model with respect to the purificatory actions included in the study, three new subjects (drawn from the same population) were individually presented with brief descriptions of each model and a list of the entire set of purificatory actions. They were asked to rank these actions in order of how well they would do at getting rid of the type of contagious effect described by the model in question. The ranking was done separately for each of the five models. Subjects also provided verbal justifications for their rankings. Although consensus was extremely high in the initial rankings, it was not perfect. Since averaging scores seemed suspect on conceptual grounds, and we did not wish to bias the rankings by adjusting them ourselves on theoretical grounds, the same three subjects were (individually) shown all three sets of rankings, including the discrepancies and verbal justifications. They then repeated their

rankings, explaining any changes they made. This second round of rankings achieved perfect agreement between these subjects. The rank orders of efficacy of purifications for each model are shown in Table 3.

Physical models differed from nonphysical models in the importance of physical cleaning versus symbolic actions. Distinctions are far more subtle among the two physical models and the three nonphysical models. Critical distinctions between the germ and the residue models were that boiling, unraveling, and cutting up into small pieces were more effective for the germ model (all decrease risk of transmission, the latter because a destroyed sweater cannot be pulled over the head/face). Also, deodorizing was less effective for the germ model than for the residue model. The major distinctions between the symbolic and associative models were for reknitting the sweater into a scarf and deodorizing, both of which decrease associative value (smell can serve as a potent reminder) but were not seen as terribly important symbolically. Conversely, gashing the sweater was identified as doing little on the associative score, but as being symbolically important. The spiritual model differed from both the associative and symbolic models mainly in the relatively minimal effect of "structural" actions on a "spiritual" essence (with the exception of burning to ash). Indeed, for the spiritual model, *only* contact with an opposite-valenced source and burning were felt to have much effect (consistent with the notion of soul-stuff being canceled out or opposed by other soul-stuff and, also, consistent with the notion of burning as one of the only ways of destroying or releasing soul energy).

Overall model tests. We compared mean purification sequence values for each source to each of the models of contagious entity. This was done by calculating Spearman Rhos between subjects' purification sequence response patterns (rank ordering the mean effectiveness of each purification for each source) and model templates (see Table 3). For positive sources, mean values were calculated based on positive scorers only. Figure 1 graphically represents the correlation of response patterns for each source, with each model. Not surprisingly, for all interpersonal sources, the most highly correlated model templates are nonphysical; best-fitting is the symbolic interaction model. For all physical sources (hepatitis, AIDS, and dogdoo), the highest

TABLE 3
RANKS OF EFFICACY OF PURIFICATIONS FOR MODELS OF ESSENCE

Action	Negative sources ^a				Positive sources					
	Germ	Residue	Spirit	Symbolic	Associative	Germ	Residue	Spirit	Symbolic	Associative
<i>Substance</i>										
Decolorize	11.5	5.5	10.5	13	9	10.5	5.5	9.5	12	8
Sun/air	7	5.5	10.5	11.5	12.5	7	5.5	9.5	10.5	11.5
Water	4.5	5.5	10.5	11.5	11	4.5	4	9.5	10.5	10
Detergent	3	2	10.5	7.5	8	3	2	9.5	6.5	7
Boil	2	3	5	7.5	10	2	3	4	6.5	9
<i>Structure</i>										
Reknit	11.5	12.5	10.5	10	6	10.5	11.5	9.5	9	5
Gash	11.5	12.5	10.5	9	14	10.5	11.5	9.5	8	13
Unravel	7	12.5	10.5	4	5	7	11.5	9.5	3.5	4
Cut up	7	12.5	10.5	4	7	7	11.5	9.5	3.5	6
Burn	1	1	4	1	1	1	1	3	1	1
<i>Opposite-contact</i>										
Enemy						10.5	8.5	1.5	3.5	2.5
Evil						10.5	8.5	1.5	3.5	2.5
Lover	11.5	9	2	4	3					
Good	11.5	9	2	4	3					
Sexy	11.5	9	2	4	3					
<i>Recrecy</i>										
1 year	4.5	7	6	14	12.5	4.5	7	5	13	11.5

^aSlightly different model "templates" were necessary for positive versus negative sources to accommodate the differences in interpersonal opposite-contact items. Also, for positive sources' sweaters, model templates included only contact with enemy and evil, but not hepatitis, AIDS, or dogdoe, because adding a disgusting substance or potential microbial contamination to a positive object seemed likely to diminish its worth regardless of the nature of the positive entity involved. No comparable complications arose for negative sources. More effective purifications (i.e., most powerful in terms of undoing contagion effects) were assigned the lowest ranks, and least effective purifications the highest ranks.

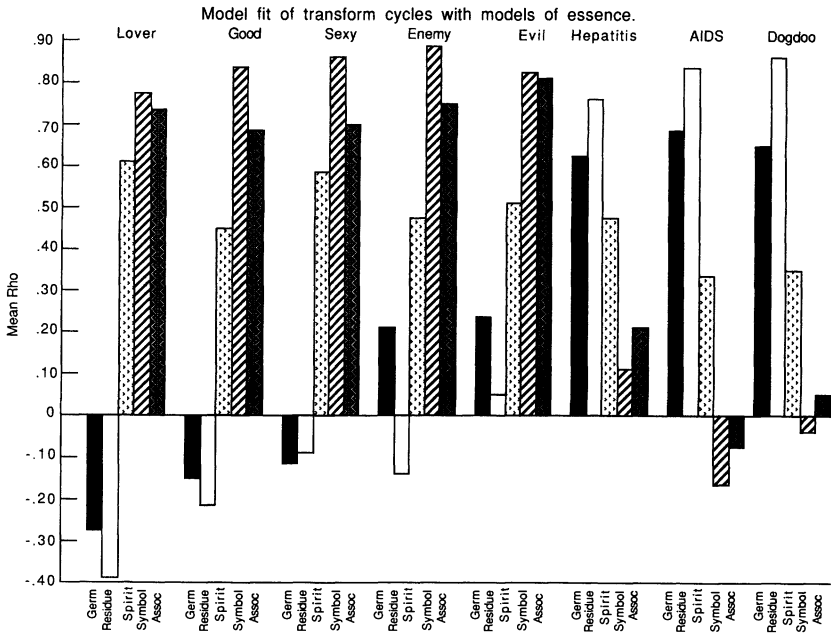


Figure 1. Bargraph of fits of purification sequences with models of essence, for each source. Bars represent Spearman Rhos of mean scores with model templates. For positive sources, only subjects showing at least a ten-point enhancement effect on the appropriate source’s sweater were included in analyses (13, 11, and 17 subjects for the lover, good, and sexy sources, respectively). For negative sources, all 36 subjects were included in the analyses.

correlations are with physical models; surprisingly, the residue model proved a better fit than the germ model.

Individual model tests. Next, we did individual tests of each subject’s response pattern for each source, correlating them, in turn, with each of the model templates to see if everyone behaved more or less as the mean data would suggest. One question of interest was whether the moral-physical distinction was in fact as “clean” as it appeared to be based on the averaged data. Therefore, an individual subject’s values were taken and correlated with each of the model templates to see, for a given source, which model that subject appeared to be utilizing.

Individual tests were done only where there were substantial effects (i.e., enhancements or decrements of ten points or more for positive and negative sources, respectively). The most highly correlated model for each subject, for each source, was tallied.⁵

TABLE 4
 INDIVIDUAL MODEL TESTS: NUMBER OF SUBJECTS SHOWING EACH TYPE OF MODEL OF ESSENCE
 AS 'BEST FIT', BY SOURCE (SPEARMAN RHOS'S)

Source	Model					No test done ^{aa}	No correlation ^{aaa}
	Germ	Residue	Spiritual	Symbol	Associative		
Lover	0	0	0	9	4	23	0
Good	0	0	2	6	3	25	1
Sexy	0	0	2	11	4	19	0
Enemy	5	3	7	10.5 ^a	1.5 ^a	4	5
Evil	4.5 ^a	1	5	7.5 ^a	8	6	4
Hepatitis	19	3	4	2	1	4	3
AIDS	14.5 ^a	4.5 ^a	5	1	0	7	4
Dogdoo	11	12	6	1	1	5	0

^aRhos within .01 of each other were counted as ties; if two models were tied for a given subject, each was counted as $\frac{1}{2}$.

^{aa}No test was done for subjects showing contagion effects of less than ten points.

^{aaa}No correlation = no correlation $\geq .30$.

Table 4 shows the numbers of subjects for whom each type of model was the best match for each source. The two additional columns in the table are "no test," showing the number of cases for each source where there was not a sufficient effect to test (that is, an effect of less than ten points), and "no correlation," showing the number of subjects for whom a test was done but none of the models correlated with the transform cycle in question with a significant rho of .30 or better. These individual model tests showed contagion from positive interpersonal sources to be absolutely uniformly nonphysical. For negative interpersonal sources, on the other hand, although most subjects used nonphysical models, several (8 and 5.5 for enemy and evil, respectively) proved to be using germ or residue models. Conversely, for physical sources (hepatitis, AIDS, and dogdoo), while a physical model was most frequent, a substantial minority of subjects seemed to be using nonphysical models (7, 6, and 8 subjects, respectively).

QUALITATIVE DATA: VERBAL RESPONSES TO OPEN-ENDED QUESTIONS

Subjects' responses to the open-ended questions about how to undo/intensify effects were analyzed in terms of what type of action

was suggested, and what its implications were with regard to the type of model being used. By this informal derivation, the models suggested by open-ended responses were extremely consistent with the results of quantitative analyses of responses on the structured purification questions. Consistent with the individual model tests, subjects' responses reflected a basic distinction between interpersonal-moral versus physical contagion, but with a blurry boundary on the negative side. Symbolic and spiritual elements were evident in several subjects' thinking about illness, with germ or residue concerns evident in several subjects' thinking about negative interpersonal sources. The verbal data mainly added depth and subtlety to the information from ratings. For example, while we used only one model of symbolic-interaction for model tests, open-ended responses suggested a distinction between the abstract symbolism component and the element of interaction, closeness, and sharing. Subjects' free responses for positive sources seemed generally more related to a sense of interacting with the source, while for negative interpersonal sources they were more related to abstract symbolism. In terms of the degree to which the purificatory actions selected for inclusion in the structured sequence were representative of subjects' spontaneous responses, all of the actions in the purification sequence (presented to subjects in the second session) came up in similar, though not always identical, form in open-ended responses (in the first session). Thus, while airing out in the sun and rinsing in warm water were not precisely mentioned by subjects, "cleaning," "washing," and "laundering" were; reknitting a sweater into a scarf was not mentioned, but changing the texture or color was; and so on. We therefore feel secure that the structured purification questions were not meaningless, bizarre, or terribly off-base for most subjects.

DISCUSSION

The current findings significantly extend our knowledge about the nature of the contagion-concept among adults in the United States. Our previous work had documented that people act as though they believe in interpersonal-moral contagion; it logically followed that some essence must be transferred, yet we knew nothing about the nature of that contagious entity. This study addressed that question. We found that the "essence" of "physical"

sources is for most people different in kind from that emanating from “interpersonal-moral” sources. Physical contagion conformed best to a residue model. Within the interpersonal-moral domain, positive and negative contagious entities were largely similar in kind, and conformed best to a symbolic-interactional model. However, the positive-negative symmetry was imperfect in that the issue of closeness and sharing was more important for positive interpersonal contagion and abstract symbolism more important for negative interpersonal contagion. Subjects frequently blurred the moral-physical distinction on the negative side, such that a germ (or less commonly, residue) concern was at times present in thinking about enemies and evil sources, while a non-physical element frequently surfaced in thinking about illness. One subject’s response superbly illustrates the blurring. With regard to the hepatitis sufferer’s sweater, he said, “I’d feel it was contaminated in some way, not only that I could get hepatitis from it, but that it was somehow contaminated, it’s just not clean. I don’t really think you could get it that way.”

Two findings are particularly interesting in the context of identifying interpersonal-moral contagious entities as nonphysical in nature. First, physical cleaning manipulations *do* reduce, very slightly, these symbolic contagion effects. This suggests that part of the symbolism involves a substance metaphor. Second, subjects’ language during the interviews was frequently unmistakably suggestive of a personal-soul-essence concept. For instance, a subject said of her enemy’s sweater, “Very negative. I just don’t want to be around him or his objects. [Why?] Because he’d give it cooties, not that I think he has cooties—but he’s just a nasty person and oozes nastiness.” This same subject said of the evil source’s sweater, “It’s the fact that he came into contact with it. Creepy. That he could somehow transmit—uh, somehow the object would pick up some negativity. I’m not saying it would smell or have dandruff on it, but it would be creepy because he’s a creepy person.” Another subject similarly illustrates this point:

I guess with evil people I feel the events have been absorbed by them, within their person, and they carry them around with them, so it doesn’t matter [whether the sweater was his, or was a new one he wore briefly] . . . like evil has the potential to be more infectious and more potent. Like he could sort of infect the sweater within half an hour as effectively as in a longer period of time.

The mixture of an influence that acts both as physical substance and as symbol, and which is spoken of in spiritual or energy language, is familiar from discussions of the various forms of mana-concept reported in traditional societies. Mana has been described in just such terms—part force, part physical substance or entity, and typically spoken of as spiritual or supernatural (see, for example, Codrington 1891; Frazer 1959[1890]; Mauss 1972[1902]). The numerous examples of subjects' responses representing evil as an oozing substance, as cooties, as something absorbed and infectious, are consistent with such a concept.

Should we conclude from these results that adults in the United States are "irrational" with regard to thinking about contagion issues? Certainly not, for several reasons. First, the question of rationality is relatively independent from the question of whether subjects show thinking that conforms to the principle of magical contagion. We view magical contagion as similar to a cognitive heuristic or "rule of thumb," which guides thinking in a particular domain, namely, that of situations involving the transmission of influence through contact. Such heuristics, as described in the cognitive psychology literature, are generally successful in that they tend to lead to correct or approximately correct (at least functional) conclusions and decisions more frequently than not.⁶ Second, while a significant subset of our subjects applied contagion models in ways that would be considered inappropriate according to the tenets of modern biomedicine, a majority did not; rather, they clearly distinguished between cases of physical versus interpersonal-moral contagion and, on average, reserved physical models for physical sources.

The term "irrational" is often taken to imply not only falsity, but nonsystematicity. We have indeed found magical-contagion type responses to be "patchy" in much of our other work, occurring inconsistently within a given individual across situations. We have suggested that this might be the result of competition between explicitly taught/held models and more intuitive, spontaneously arising ones in medically oriented Western culture. However, we do *not* consider the thinking evidenced by our subjects in *this* study to be unsystematic or arbitrary. Subjects were generally quite clear about their responses; many could articulate explanations for even very "magical" responses. Even responses of those who could not, or whose "explanations" did not, in fact, account for their re-

sponses, were not arbitrary. While subjects distinguished contagious sources in different ways, *all* used strategies that could be construed as reasonable, that is, having a logical basis of some sort although it might not conform to biomedical germ transmission. Some subjects used a single model across all sources (this was virtually always a nonphysical model); others used one model consistently for all interpersonal-moral sources and another for all physical sources; still others used one model for positive sources and another for negative sources. The question, then, is not whether subjects are being “irrational” but, rather, *which model* they are applying in which situations, and why. Contagion thinking may serve a variety of valid, that is, rational functions, instrumental, expressive, and/or symbolic. Thus, by describing thinking as consistent with the “magical contagion” principle, we do *not* necessarily mean to imply irrationality or falsity but, merely, operation of a more generalized, intuitive concept of contagion, which is formally the same as that described in myriad traditional cultures and which often forms the basis for beliefs, rituals, and practices that Western observers have termed “magical.”

We can conclude from these data that almost all of our subjects do have the kinds of feelings predicted by the magical law of contagion and engage in such thinking in certain contexts. We also feel secure that the data are not simply accounted for by the unconscious mind being more sensitive to germs than the conscious mind and, so, leading to a general strategy of overcautiousness in germ-related scenarios even where one consciously sees no reason for concern. While such an explanation would account for *some* findings (e.g., the basic phenomenon of a residual emotional effect even after washing), it clearly could not account for all of them (e.g., the fact that contact with opposite-valenced sources at times worked better than laundering). Furthermore, while a general “contagion” concept is clearly present, the details of its operation appear to be filled in differently by different subjects, in different cases. This conceptual variability obviously has important implications for educational intervention programs aimed at limiting the spread of contagious diseases such as AIDS.

We do not think it is the case that all subjects actually have explicit mental representations of one or more models of contagion; indeed, in this study, we and the subjects often had the impression that the accounts given were being fashioned on the

spot, to explain their own surprising reactions. However, we also do not think it is the case that we were forcing subjects to create an account when actually no coherent system existed in their minds. While we obviously cannot know for certain what is “in there,” we think it likely that those subjects without explicit mental representations of contagious models were doing something similar to what frequently occurs in research on linguistic rules, where subjects discover their implicit rules as they go along.

With regard to whether subjects utilizing spiritual or symbolic models of contagion actually “believe” that harm will come to them if they wear an evil person’s sweater, we postulate a continuum from the metaphorical to the magical, involving a shift from creative symbolization to a theory of causation. Few subjects expressed explicitly voiced expectations that harm or good would occur from interpersonal-moral (as opposed to physical illness) contagion—although there were a small number of such responses. Most expressed only pleasure or discomfort, or feeling “as though,” to varying degrees. This does not imply that the phenomenon of spiritual-symbolic contagion is weak, without major implications for understanding behavior among Americans. Several subjects seemed to experience a real state of conflict between their “head” (articulated, consciously held) models of contagion and their “heart” (implicit, perhaps unconsciously held) models during the interviews. Others showed no overt signs of awareness of, or stress over, an overt-versus implicit-model discrepancy but, nonetheless, demonstrated it, as in the case of a subject who said that he would not want to wear his enemy’s sweater because, “his stuff is in it. [Stuff?] Yeah, you know, dirt, germs, sweat—stuff!” When asked later, in the structured purification questions, whether laundering would help, this subject reported that the various physical cleaning actions would not help at all. Clearly, then, the articulated answer was an inadequate post hoc attempt to make sense of an intuitive gut reaction. The extent to which “head” versus “heart” determines behavior in various situations remains an empirical question.

LIMITATIONS OF THE STUDY

This study was less than perfect in several ways. One concerns the verbal report format. It is entirely possible that some of those who expressed discomfort at the idea of contagion scenarios would be less moved by the actuality; conversely, a situation that seems

fairly benign in imagination might be more potent *in vivo*. It is also possible that even strong contagion-related feelings can be suppressed or disregarded in the face of pragmatic situational concerns. No doubt many of us who initially cringed at the idea would be willing to wear Hitler's sweater for \$250. Inasmuch as the study was carried out in response to the authors' observations of people's daily behaviors in the real world, we do not consider the risk of lack of ecological validity to be a serious one. Still, contextual influences on the likelihood and magnitude of such responses should clearly be the focus of future research.

Of more concern to us is the validity of taking the "best-fitting" model (defined as the template that correlated most highly with a subject's actual pattern of responses on purification questions) as indicating the specific model a subject is using. None of the model tests produced perfect correlations with any template, which raises the possibility that subjects were actually using conceptually distinct models of essence from the ones we assessed, rather than simply making slightly different interpretations as to model predictions (as occurred between raters in our initial round of template derivations). It was to control for this that we included the open-ended questions in the first interview session. The very high consistency between qualitative analysis of open-ended responses and structured purification sequence analyses is reassuring.⁷

APPLICATIONS AND IMPLICATIONS OF RESULTS

Our findings have obvious relevance to a number of broad issues. Clearly, further integration of sympathetic magical principles with the literature on lay cognition must be done. A growing literature on so-called "failures of rationality" (see, for example, Nisbett and Ross 1980; Tversky and Kahneman 1974) suggests that current theories of thinking do not adequately describe lay logic. If magical contagion is viewed as a causal "heuristic" (contact causes influence) that substitutes for more complex notions such as contingency or specific causal mechanisms, we should begin to specify how, when, and why we fall back on it and explore its relation to, and interaction with, other cognitive heuristics. We raise the further possibility that, rather than reflecting an isolated "heuristic," magical contagion might, instead, be better conceived of in terms of a different fundamental mode of processing information, namely, metaphor—the process of conceptually mapping from

one domain to another (including metonymy, in which the “part” stands for the “whole”). Metaphor and metonymy have been receiving increasing attention by cognitive psycholinguists such as Lakoff (1987) and Johnson (1987), as well as anthropologists such as Tambiah (1990). In fact, we feel it is most likely that some combination of a preprogrammed heuristic, guiding how we form associations, and metaphorical extensions and elaborations of it will best explain contagious thinking.

The issue of moral-germ blurrings has obvious relevance to clinical applications of medical anthropology. This is especially so in the context of educational efforts addressing infectious diseases, both in developing nations and at home in the United States. The current AIDS epidemic, with its attendant educational issues regarding prevention and illness-related social stigma, is a case in point. We have shown in other work that lay thinking about AIDS does show features characteristic of magical contagion (Nemeroff et al., 1994; Rozin et al., in press; Rozin et al. 1992), and that people’s sense of the threateningness of germs is confounded by their feelings about the source-person carrying those germs (Nemeroff 1992).

Finally, the study of magical contagion is very broadly applicable to the study of personality and the self. There are, unquestionably, large individual differences in the propensity to think in this mode, as well as in the degree to which people feel personally vulnerable to “contagion” of various sorts. Many characteristics might be hypothesized to be related to contagion-type thinking and sensitivity to contagious contact—creativity, neuroticism, religious and supernatural beliefs, disgust sensitivity, and security of self-boundaries, to name a few. We find, also, the subtleties of magical contagion feelings to be a useful way of studying self-concepts, ego-boundaries, and desires to merge with or separate from others, and mapping the limits and flexibility of the extended self. The magical contagion concept is a novel and relatively easily quantified way to map relationship and boundary issues that, theretofore, have been assessed largely by projective techniques, or not at all.

We feel that the high degree of interest shown by our subjects with regard to our scenarios and questions and their fascination with the conflicts that arose between “head” and “heart” are important, indicative of the fact that our implicit models do not necessarily match our explicit ones.

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NOTES

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1. Effects for negative contagion were much stronger than for positive contagion; however, positive effects did occur in a sizable minority of subjects.

2. Purifications in a given class were presented sequentially, with the order of specific purifications within categories fully randomized between subjects. Categories were presented in two different orders: "recency" was always presented first, and "opposite-contact" last, to prevent confusion due to changes in question format between these categories and the others. However, the order of "physical cleaning" and "structural" purifications was reversed for half of the subjects.

3. While going through the purification sequence for the first source's sweater, subjects also rated how they would feel about a new identical sweater, identically treated, for comparison.

4. We note the similarity of this model to the notion of "magical identification."

5. Correlations within .01 of each other were considered as ties and each assigned 1/2 point in the frequency tally.

6. Nisbett and Ross (1980) liken the cognitive system to the human visual system: for the most part, heuristics that "fill in the blanks" in terms of visual information work very well, but occasionally, they will lead to "illusions." Similarly, cognitive rules of thumb that fill in blanks and allow for cognitive economy are generally adaptive but can, and will, give rise to maladaptive or inappropriate responses on occasion.

7. It is worth noting that the differences between the various interpersonal models (symbolic, associative, and spiritual) were very subtle in terms of the differences in predictions they made for efficacy of purifications, as were the differences between predictions for the germ and the residue model. We kept all five models (rather than collapsing down to two broad models) because they seemed to us to be *quite* distinct from each other conceptually. Our purification protocol did well in distinguishing physical from moral models, and even the germ from the residue model, but did less well differentiating the three nonphysical models. Future work should attempt to identify better differential predictions made by these and any other models assessed.

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